THE

RAILWAY GAZETTE

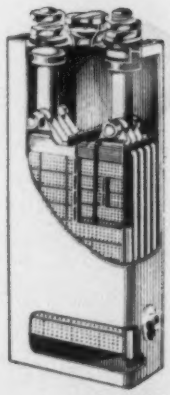
Price : Two Shillings | FRIDAY, MARCH 10, 1961 | Annually £5 by post

DESIGNED TO TAKE IT

NIFE Steel Alkaline batteries are not finicky or fussy. Electrically and mechanically, they take the rough with the smooth. Even severe shock and continuous vibration will not harm them.

They will withstand widely varying electrical conditions without damage, including the delivery of continuous high currents down to short circuit, followed by rapid re-charging. For emergency or intermittent use, NIFE batteries are the logical choice. After standing by for some years they will respond as if freshly charged. They are compact, light in weight, and will give the longest life with the minimum of maintenance.

Far-sighted engineers specify them for TRAIN LIGHTING · AUTOMATIC TRAIN CONTROL
EMERGENCY TRAIN LIGHTING · SEARCHLIGHTS AND INSPECTION SETS
DIESEL ENGINE STARTING · BATTERY ELECTRIC TRUCKS · SWITCHGEAR OPERATION
ALL FORMS OF TRACK AND SIGNAL CONTROL



TGA N1B3

FIT FOR A LONG LIFE **NIFE**
STEEL ALKALINE BATTERIES

NIFE BATTERIES · REDDITCH · WORCESTERSHIRE

A

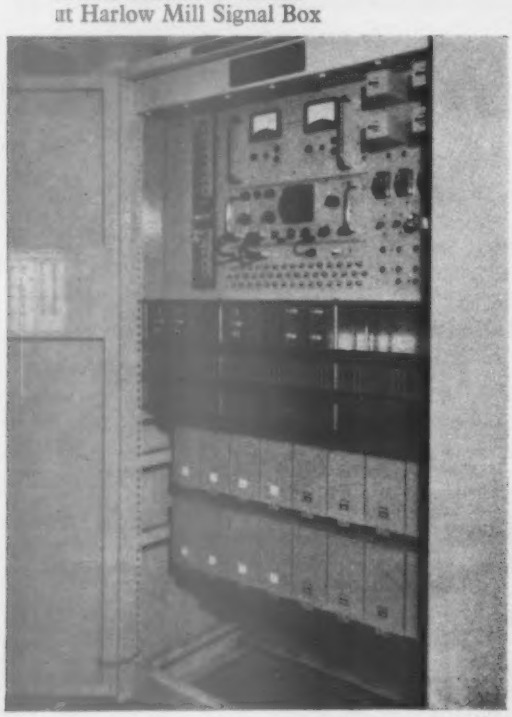
BETHNAL GREEN TO ENFIELD, CHINGFORD, HERTFORD EAST AND BISHOPS STORTFORD

New control desk at Broxbourne

Resignalling for A.C. electrification on Eastern Region of British Railways covering approximately 110 track miles

WESTINGHOUSE

Westronic remote control equipment in self-contained cubicle at Harlow Mill Signal Box



SIGNALLING

INSTALLED THROUGHOUT

Covering the supply and installation of electro-mechanical, all-electric, and electro-mechanical panel type equipments (Hybrid), together with 183 new searchlight type running signals, 826 track circuits, etc.

Remote control of Clapton Junction from Hackney Downs signal box and Harlow Town Station layout from Harlow Mill signal box has been effected by the "Westronic" high-speed system.

Many thousands of plug-in relays have been used throughout the installation, many of them of the latest miniature type.

Signalling supplied and installed by :–

WESTINGHOUSE BRAKE AND SIGNAL CO. LTD.

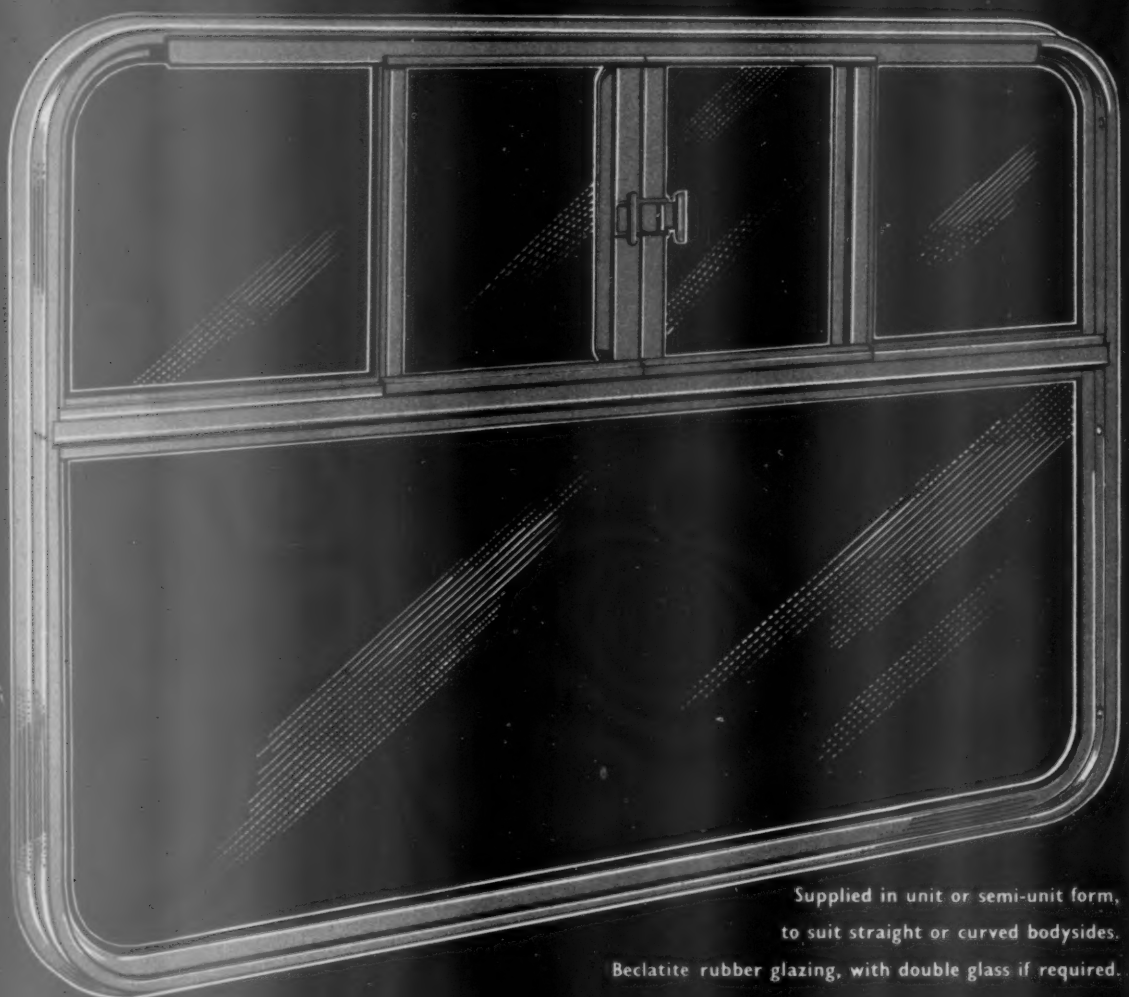
82 YORK WAY • KING'S CROSS • LONDON, N.1

McKenzie & Holland (Australia) Pty. Ltd., Melbourne.
Saxby & Farmer (India) Private Ltd., Calcutta.
Westinghouse Brake & Signal Co. S.A. (Pty.) Ltd., Johannesburg.
Agents—Bellamy and Lambie, Johannesburg.

BECLAWAT

Hurricane

UNIT WINDOWS



Supplied in unit or semi-unit form,
to suit straight or curved bodysides.
Beclatite rubber glazing, with double glass if required.

BECLAWAT **BECKETT, LAYCOCK & WATKINSON LTD.**

ACTON LANE, LONDON N.W.10

for every type of locomotive

for ALL operating conditions

In the interests of rail safety, designers of all new locomotives, rail-cars and electric motor coaches, should remember the positive reliable sweep given by TRICO heavy duty window wipers.

Higher speeds . . . more exacting requirements . . . means drivers must have the confidence which clear vision . . . TRICO vision . . . provides even under the worst possible conditions.

Let our experience gained throughout the world assist you in your designs. Our engineers are always ready to call upon you for consultation.

be safe . . . right from the start with

TRICO WINDOW WIPING EQUIPMENT
and two-tone warning horns

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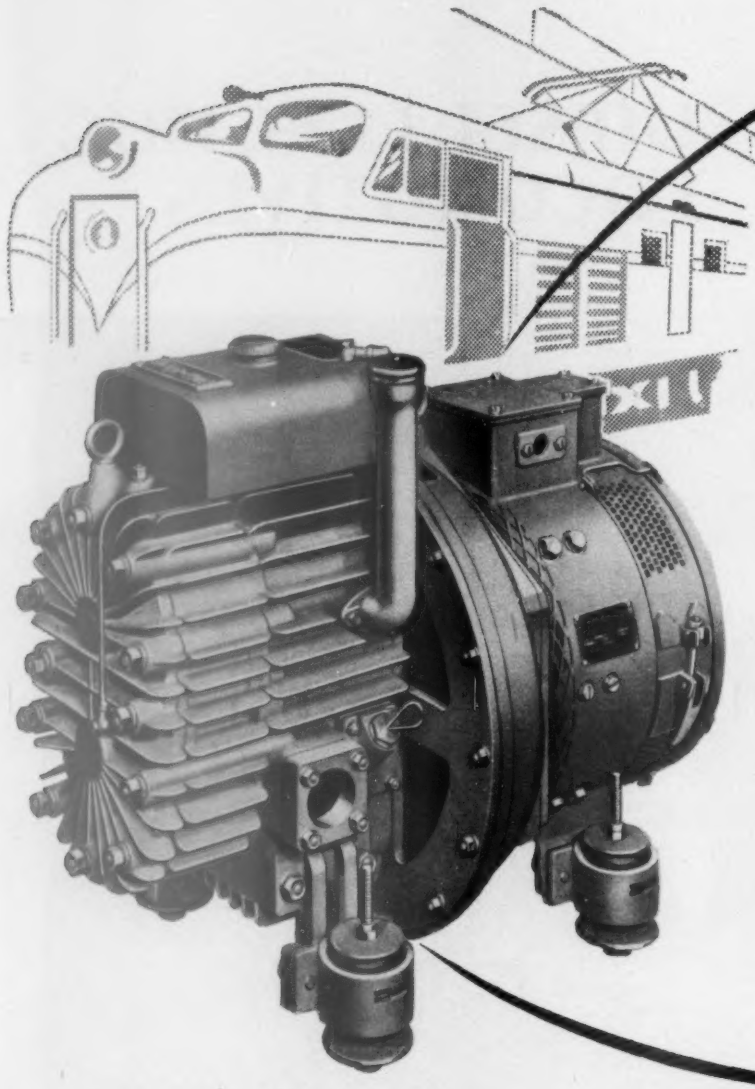
Smee's TF107



The NEW Northey Flange Mounted Rotary Exhauster

TYPE 125 R.E.F.M.
NOMINAL SWEPT
VOLUME 125 c.f.m.

NOTE: Large capacity (250 c.f.m.) machine also available.

Northey Exhausters are manufactured for Gresham and Craven Ltd. by Northey Rotary Compressors Ltd., Parkstone, Dorset.

- ***sets new minimum space and minimum weight standards for Diesel and Electric Locomotives***
- Exhauster weighs only 205 lbs. Length overall (with motor) approx: 30 inches.
- PERFORMANCE—ONE EXHAUSTER ONLY AT RELEASE SPEED.
- 21" Hg Vacuum against $\frac{3}{8}$" leak hole. Guaranteed oil consumption not exceeding 1 gallon per 1000 hours running. Now in full production for Diesel Electric and Diesel Hydraulic Locomotives for British Railways.

GRESHAM & CRAVEN LTD
LONDON OFFICE & SALES:
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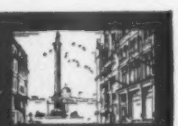


Head Office and Works: Ordsall Lane, Salford, Manchester 5. Telephone: DEAnsgate 6061/4. Telegrams: Brake, Phone, Manchester
3830

NEW TUBE CARS FOR LONDON TRANSPORT

This new type of tube car is now being supplied to the L.T.E. by Cravens Ltd.

New features include :—

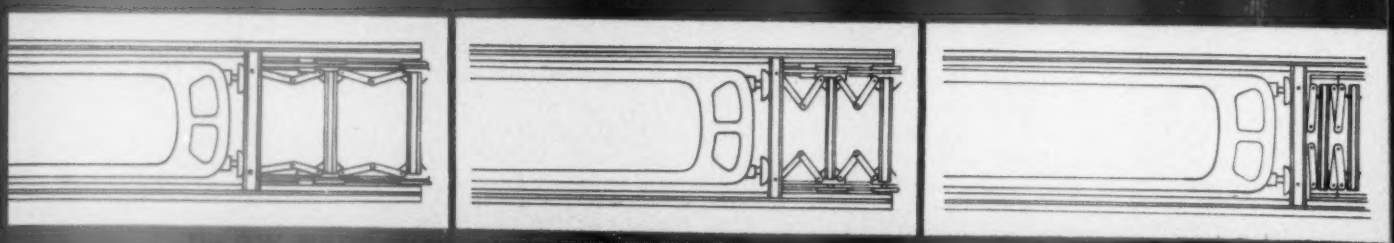
Revised layout of seating.
Large Windows.
Wider Vestibules.
New ventilation System.
Two Traction Motors per Bogie.
Plastic Interior Panels.

CRAVENS LTD.
SHEFFIELD

Extra Safety with

THE BUFFER STOP THAT . . .

ELIMINATES SUDDEN IMPACT



GODWIN WARREN (ENGINEERING) LTD

EMERY ROAD, BRISLINGTON, BRISTOL 4. Telephone: BRISTOL 77072

GW ENGINEERING

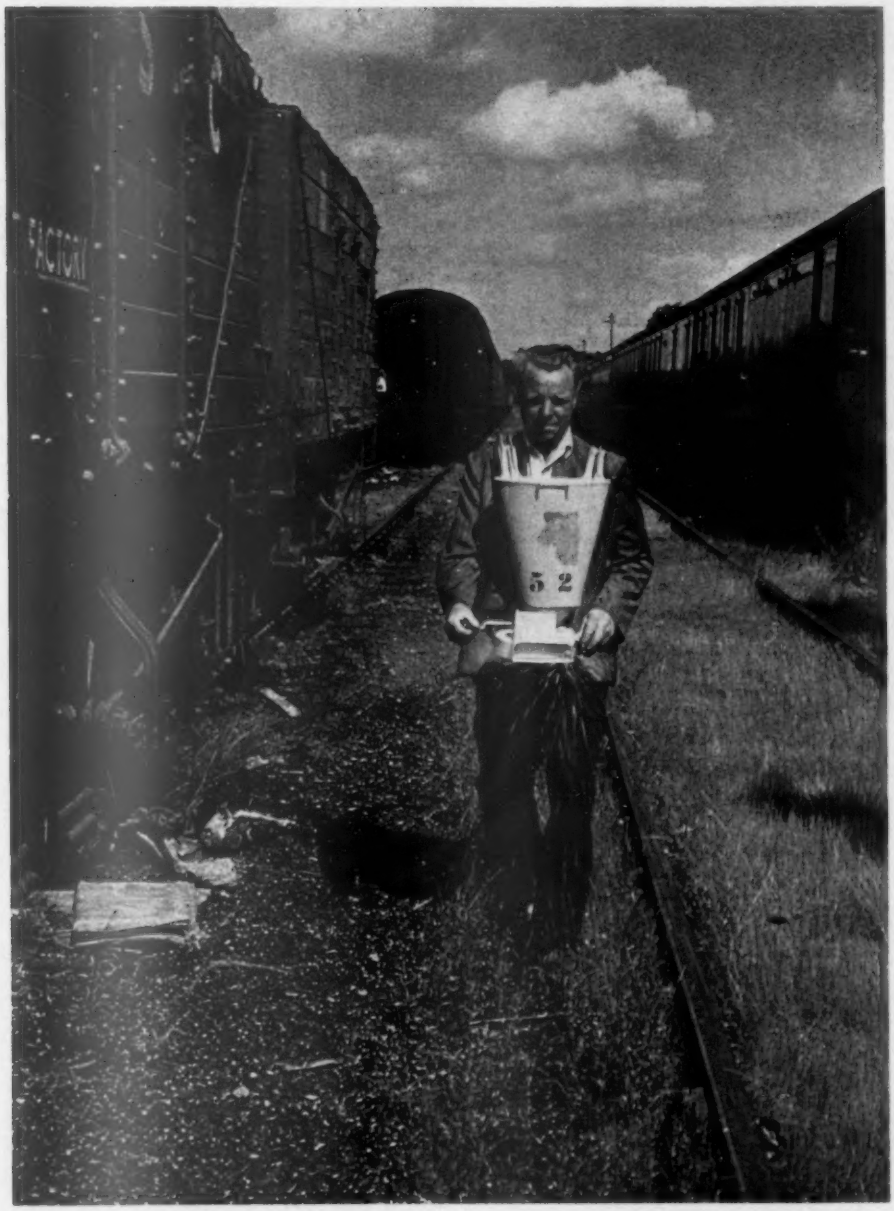
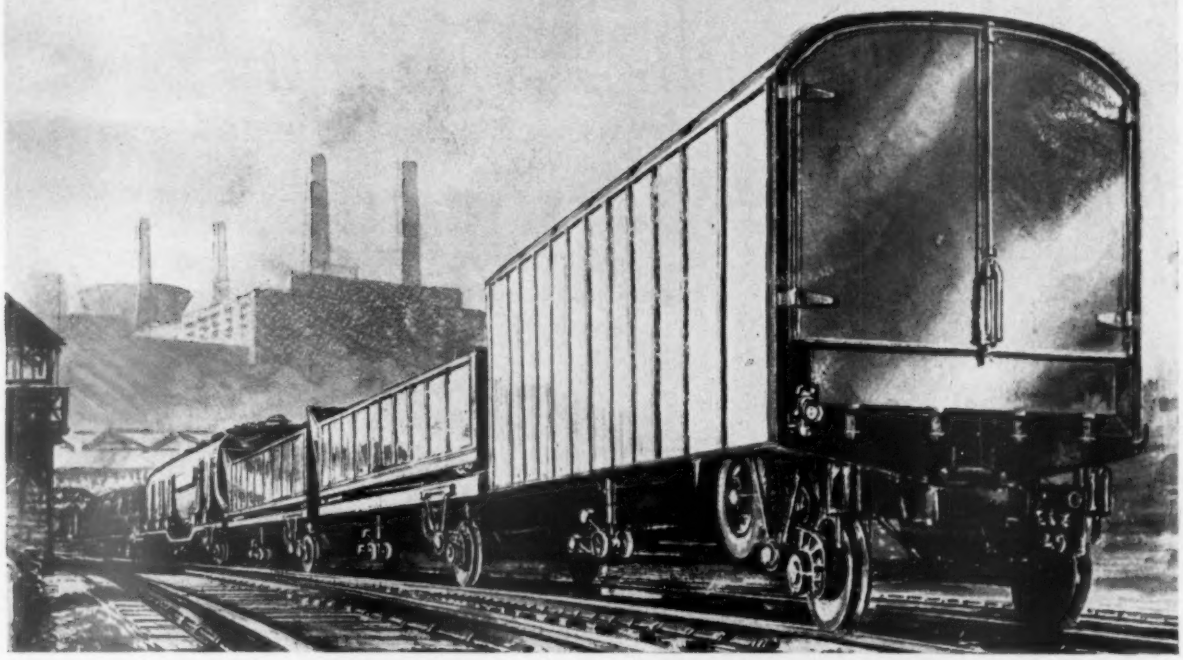
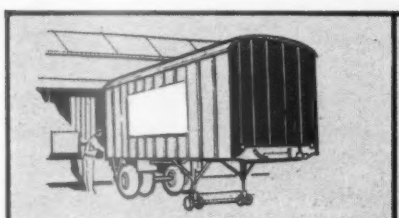


Illustration shows treatment of Sproughton Sidings, Ipswich. *Photo, by courtesy of Chief Civil Engineer, Eastern Region, British Railways.*

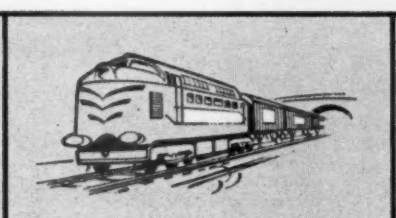
Now–the ROADRAILER



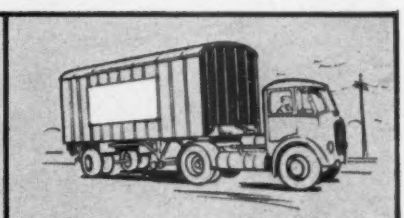
...speed and economy on trunk hauls and door-to-door service too!



1 The Roadrailer, loaded at the factory as an ordinary articulated lorry.



2 The Roadrailer as part of a fast freight train.



3 The Roadrailer converted back to a lorry completes delivery by road.

Now it's an 11-ton lorry, loaded in the usual way and driven by road to the railhead. Only 150 seconds to retract the road wheels and lower the rail wheels and hey presto – now it's part of a fast freight train designed for through travel at an average speed of 60-65 m.p.h.

The Roadrailer brings your railhead to your customer's factory. It brings the best of both worlds, giving traders the economy and uncluttered speed of long-distance rail haulage *plus* the convenience of door-to-door collection and delivery. It can be adapted for liquids, timber, cement – all kinds of traffic.

The introduction of the Roadrailer is in *any* country's interest: it frees the roads, puts trunk haulage on the railway where it sensibly and economically belongs, and helps industry by making transport cheaper and faster.

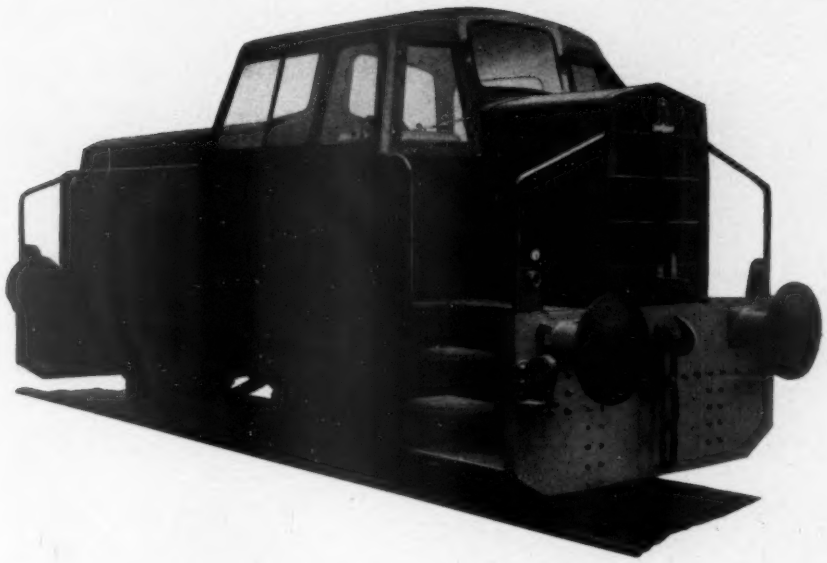
150 SECONDS — YOU CAN HAVE THE BEST OF BOTH WORLDS

PS

PRESSED STEEL CO LTD

Railway Division,
Linwood Factory, Paisley, Scotland

LONDON OFFICE: Railway Division, 47 Victoria Street, London, SW1. HEAD OFFICE: Cowley, Oxford. BRUSSELS OFFICE: Cantersteen 7, Galerie Ravenstein 30, Brussels 1, Belgium. Manufacturers of motor car bodies, Prestcold refrigeration equipment and pressings of all kinds.



Sentinel chose

Laycock-Knorr

BRAKING EQUIPMENT

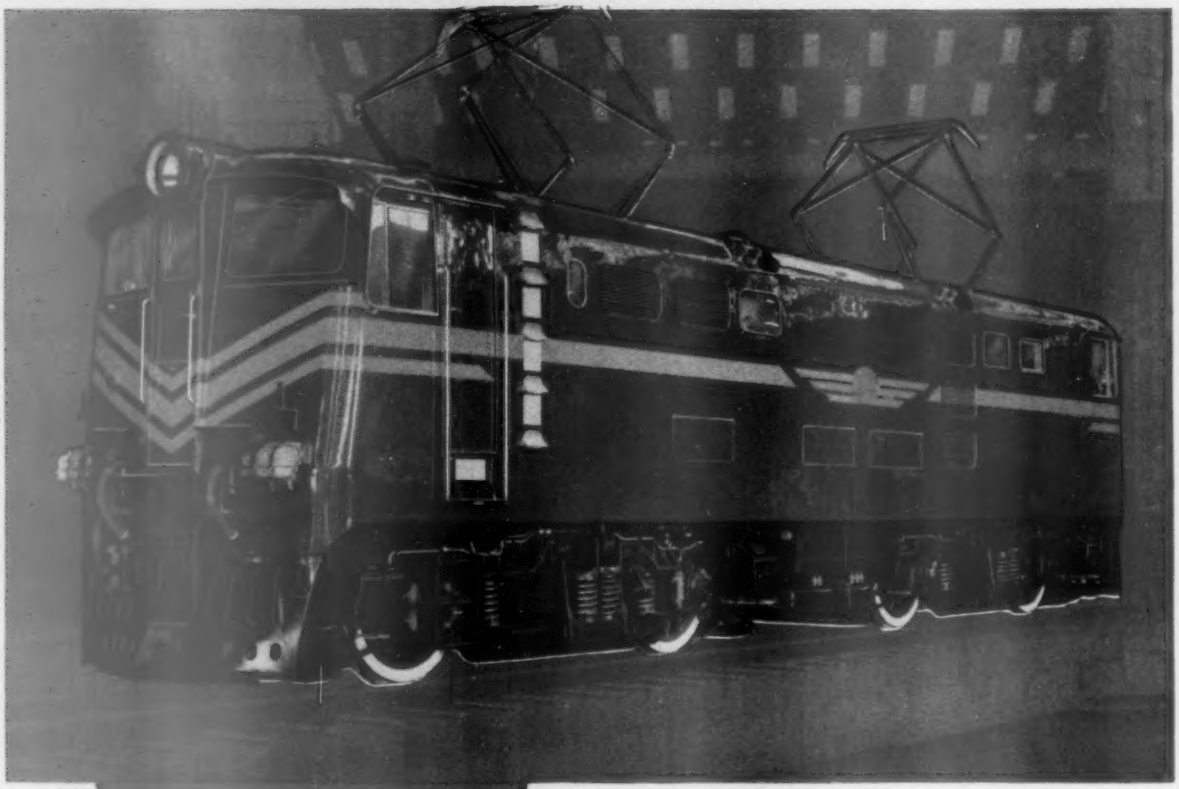
View of cab interior showing dual driver controls.

The new Sentinel 34 ton O-4-O Diesel Hydraulic Industrial Locomotives now going into service are all fitted with Laycock-Knorr compressed air brake equipment and pneumatic sanding gear.

This equipment, together with various other types of railway vehicle braking apparatus used extensively on the continent and developed by Knorr-Bremse of Munich over the last half century, is now manufactured and offered by

Laycock
ENGINEERING LTD
Millhouses · SHEFFIELD 8

Member of the
Birfield Group



35 Type 5-E.1 Electric Locomotives are being built by METRO-CAMMELL for the South African Railways.

(Main Contractors — A.E.I. Ltd.).

METRO~CAMMELL

ELECTRIC LOCOMOTIVES FOR South African RAILWAYS

METROPOLITAN-CAMMELL CARRIAGE & WAGON CO. LTD.

HEAD OFFICE : SALTLEY, BIRMINGHAM 8 • LONDON OFFICE : VICKERS HOUSE, BROADWAY, WESTMINSTER, S.W.1

with Thermit Welding 'Quick' process

The new Thermit Welding "Quick" process means track welding at speed! A fair average time is only 13 minutes after completing rail alignment to the finished weld—only 16 minutes if two rails are welded simultaneously—leaving only fettling and grinding for completion of the job. Really impressive time saving with all the advantages inherent in *welded* rails.

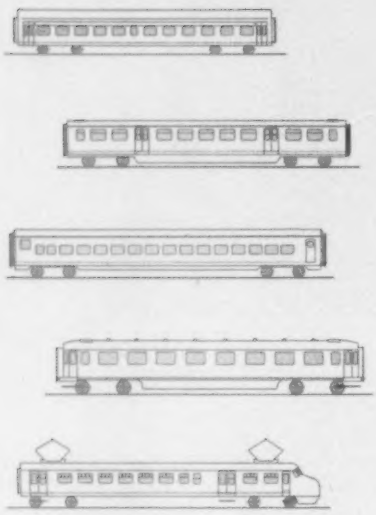
Economical, too. The Thermit Welding "Quick" process can be carried out by local labour under trained supervision and the equipment is easily transported.

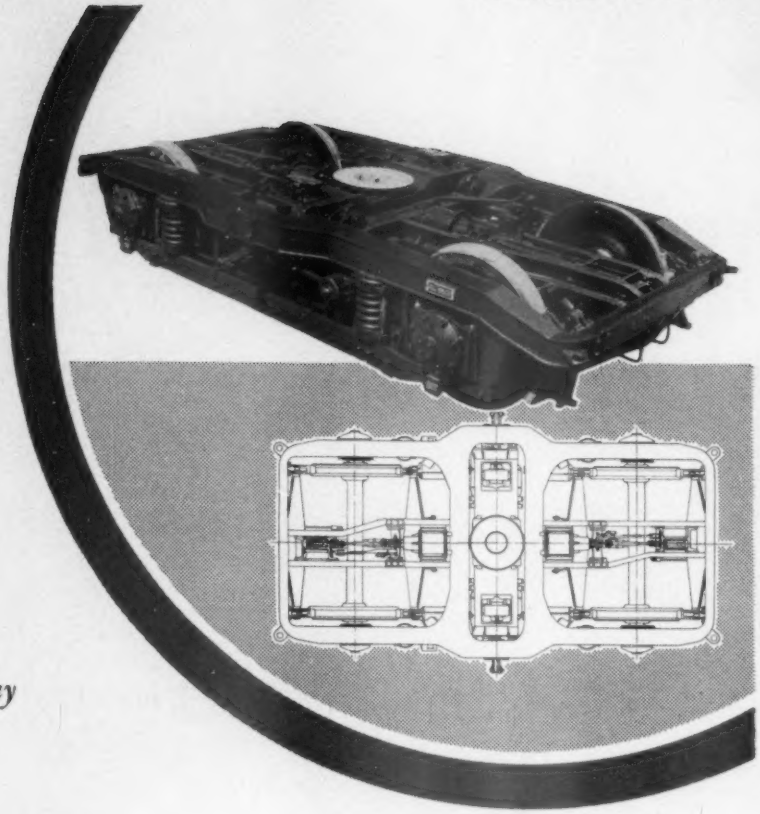
These illustrations show 95 lb. B H rail being joined by the "Quick" process on British Railways—Western Region. The process can be used for any rails normally used in railway tracks.

THERMIT WELDING [Gt.Britain] LTD

RAINHAM, ESSEX. TELEPHONE: RAINHAM, ESSEX 3322

GD. 396





Worldwide satisfaction to railway men and passengers alike:

Werkspoor integral coaches

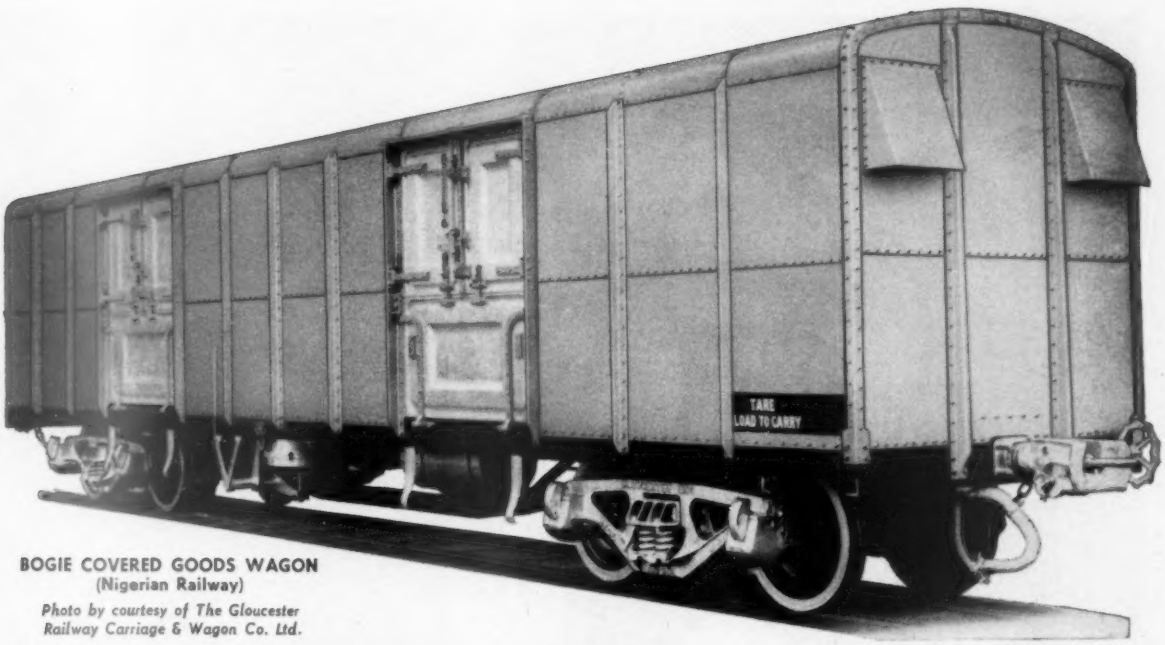
For 26 years Werkspoor has been building all-welded integral coaches - many thousands of them. Just a few of the many different types are illustrated here.
Werkspoor integral coaches are light, strong and highly finished. For the design of the interiors, specialist architects are employed.

An important contribution to passenger comfort is the Werkspoor design of bogies.
They ensure perfectly smooth running.

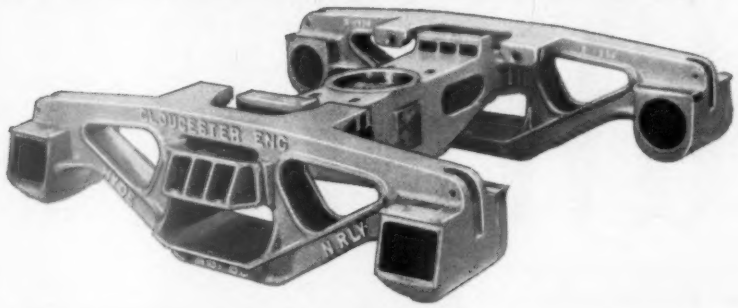
Werkspoor Rolling Stock Department is at your disposal to solve your problems.
More than a century of experience is at your command.

WERKSPOOR
WORKS AT UTRECHT

Baudouin



BOGIE COVERED GOODS WAGON
(Nigerian Railway)
Photo by courtesy of The Gloucester Railway Carriage & Wagon Co. Ltd.



Gloucester Patent Cast Steel Bogie Assembly produced for the Gloucester Railway Carriage & Wagon Company Ltd., and widely used Overseas on the Nigerian, Ghana, Ceylon, Sudan and Argentine Railways.

A typical example of the high quality castings regularly supplied for GENERAL ENGINEERING, WAGONS, LOCOMOTIVES (Steam and Diesel), COMMERCIAL VEHICLES, COLLIERY PLANT and ELECTRICAL MACHINERY.

ROBERT HYDE CASTINGS

NORTH STAFFORD STEEL FOUNDRY • STOKE-ON-TRENT
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THIS TRAIN IS GOING PLACES

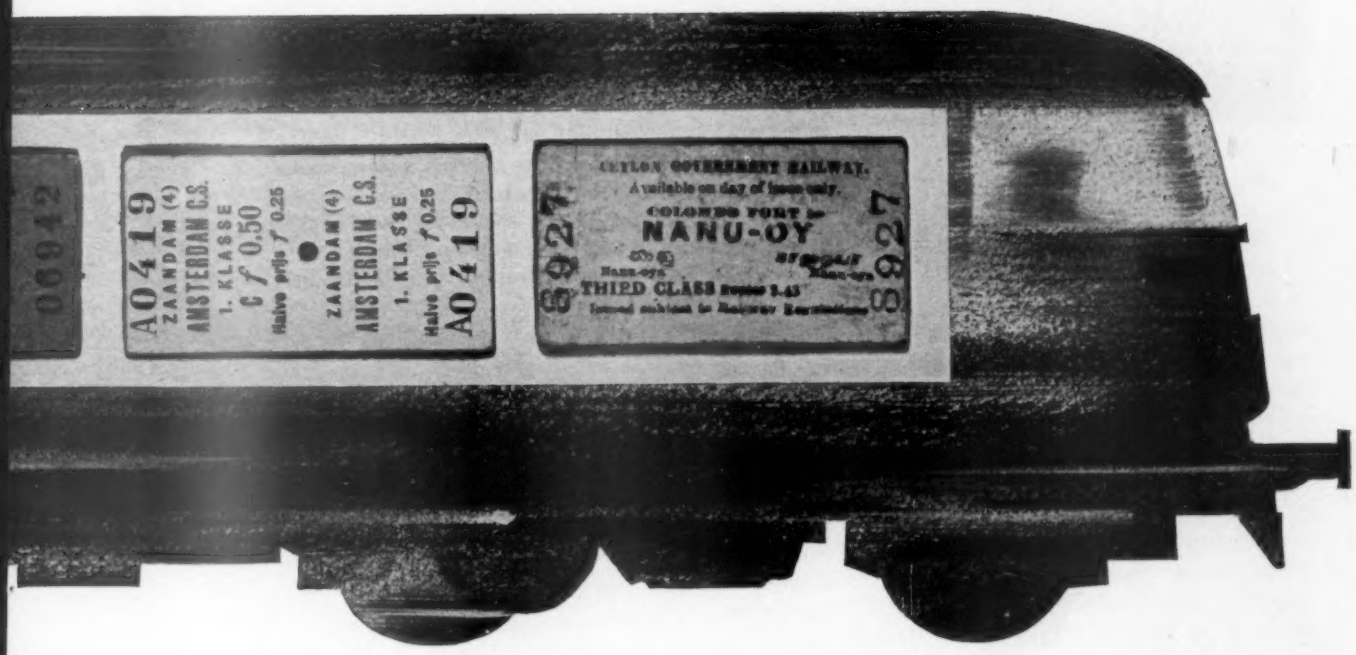
Johannesburg . . . Bombay . . . Lisbon . . .
Sarandi . . . Amsterdam . . . Nanu-Oya . . .
It could be any of these and more,
for G.E.C. can supply traction
equipment to *any part of the world.*

Complete electrification
Locomotives and trains—electric
and diesel-electric
Cables, track structures
and overhead lines
Power stations and sub-stations
Signalling and communications
Remote supervisory control
Lighting and heating
Kitchen car equipment

RELY ON THE

THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND
TRACTION DIVISION BIRMINGHAM 6

377



EXPERIENCE OF G.E.C.

METCALFE'S

AIR BRAKE EQUIPMENT for Locomotives

OERLIKON PATENT DESIGN

TYPE FV.3 An Automatic Driver's Air Brake Control Valve suitable for medium length goods and passenger trains or railcars, etc. This Valve is simple to operate and of light weight construction. It enables the full benefit to be obtained from modern step-by-step application and release of air brakes. Leaflet A.1.

TYPE FV.4 A standard Driver's Automatic Air Brake Control Valve with automatically controlled high pressure brake releasing impulse. This Valve enables the maximum speed of brake release to be obtained, and in addition enables the full utilisation of all the advantages associated with modern air brakes. The Valve is reliable in service and simple to operate and maintain and is especially suitable for long express passenger and goods trains. Leaflet A.4.

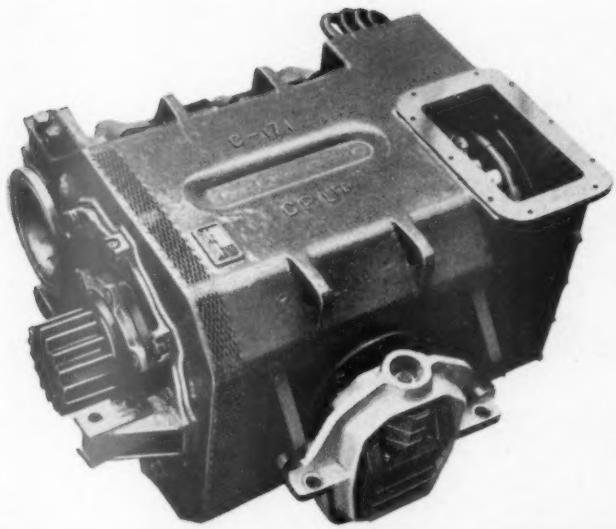
TYPE FD.1 This is a simple Brake Control Valve suitable for direct braking or shunting brake requirements. It is very simple to use and accurate in operation. The type FD.1 Valve can also be adapted for the control of the Diesel engines and can also be made suitable for cam operation. Leaflet A.13.

TYPE LST.1 A locomotive Triple Valve of modern and simple design. The LST.1 Operating Valve embodies a control for freight or passenger train operation, together with a high efficiency Brake relay, also an Anti-skid Brake device may be provided when required. This Valve is capable of controlling the air supply to several Brake Cylinders when required. Leaflet A.2.

DAVIES & METCALFE LTD.

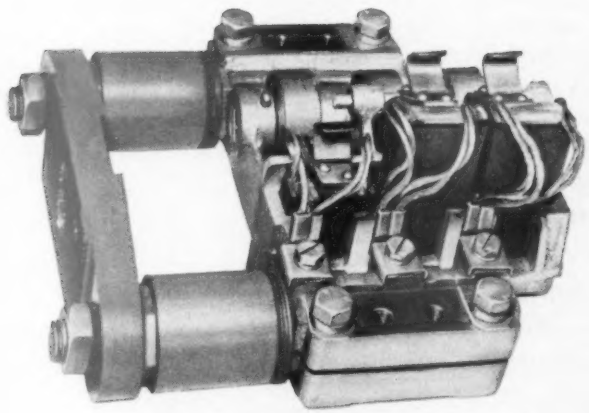
INJECTOR WORKS · ROMILEY · ENGLAND

Telephone: WOODLEY 2626 (2 lines) Telegrams: EXHAUST, ROMILEY



Engineers use the word performance in two senses, a limited one which refers to parameters that can be specified and checked; and a wider, vaguer, but essentially more realistic sense which covers freedom from trouble, ease of servicing, adaptability and many other things. Performance in the first sense is reproducible by any competent manufacturer; it depends on designing to well established principles. Performance in the second sense is the basis of choice between manufacturers. It comes from countless small differences in design that are based on know-how or experience.

This thing called know-how



Look at this brush-box from a traction motor; an ordinary enough piece of equipment but nevertheless embodying a great deal of experience. Note for example the very heavy insulators made from an unshatterable, non-tracking synthetic material vastly superior to porcelain. Note how the spring can be disengaged so that the brushes are easily slipped out for inspection and that the pressure on each brush can be adjusted separately. Where, owing to the design of the locomotive, there is no access to the top of the motor, the brushgear is mounted on a ring, normally clamped and dowelled in position but, when released, capable of being racked round by a gear engaging teeth in its periphery to bring each set of brushes in turn to the position from which they can be most easily reached. It is on details of this kind that performance in service depends.

Crompton Parkinson LIMITED

CP TRACTION EQUIPMENT

Makers of Electric Motors of all kinds, A.C. and D.C. Generators, B.E.T. Transformers, Switchgear, Cables, Instruments, Lamps, Lighting Equipment, Batteries, Stud Welding Equipment, Traction Equipment, Ceiling Fans.

CROMPTON PARKINSON LTD., TRACTION DEPT., CHELMSFORD, ESSEX. Tel: Chelmsford 3161. 'Grams & Cables: Crompark, Chelmsford.

TE612

Diesel Mechanical
Wheel arrangement 0-6-0
Dorman 6QA diesel engine 208 H.P. at 1,300 r.p.m.
Weight 33.5 tons
Starting Tractive Effort 17,860 lbs.

Right on the rails with

BAGNALL

Bagnall are always on the rails right from the design stage — when it comes to locomotives: mostly diesel. They plan them, design them, build them, and power them with any first class diesel engine — Dorman for example. And they're the best, here and throughout the world.

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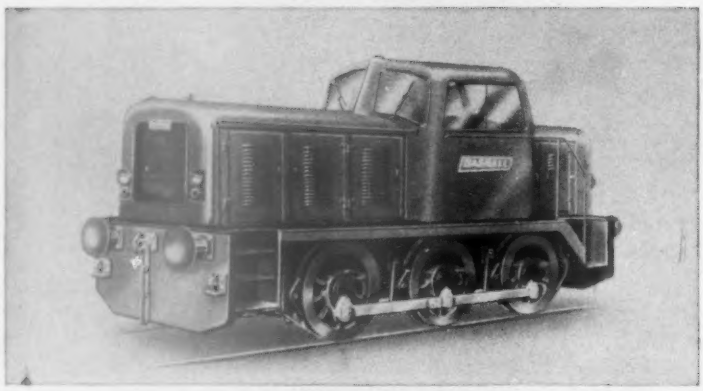


Diesel Hydraulic
Wheel arrangement 0-6-0
Dorman 6QAT diesel engine 342 H.P. at 1,800 r.p.m.
Weight 48 tons
Starting Tractive Effort 32,300 lbs.

BIA

ELECTRIFICATION on the FRENCH RAILWAYS

★

120 MORE MILES ELECTRIFIED IN 1961

PB 79A

Photo: courtesy of Associated Electrical Industries (Manchester) Limited

This complete telephone cable communications system between Manchester and Carlisle was engineered, manufactured and installed by STC as part of British Railways Traffic re-organisation Scheme.

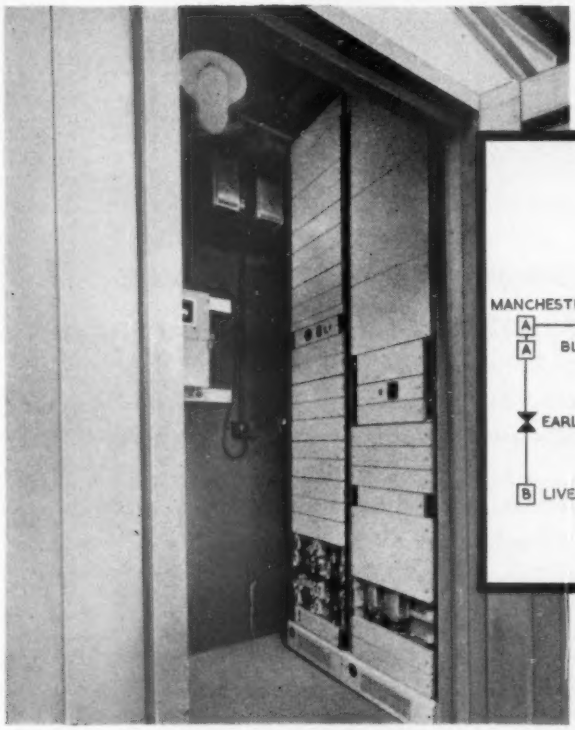
STC and railway modernisation

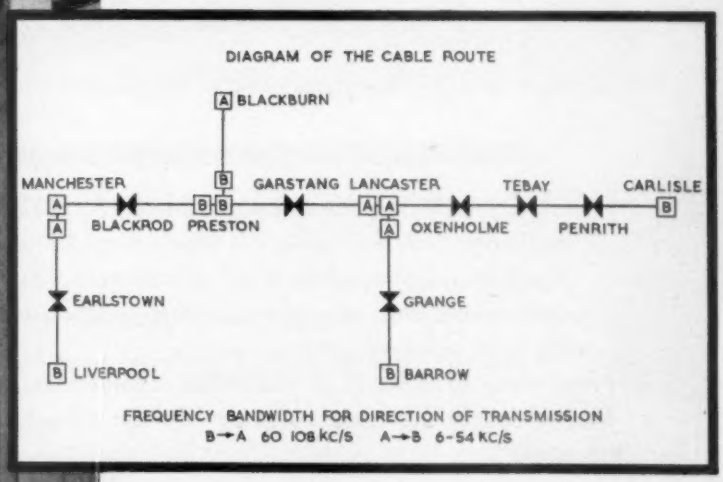
TRANSISTOR CARRIER EQUIPMENT FOR BRITISH RAILWAYS, LONDON MIDLAND REGION.

Terminal and repeater equipment of the STC All-Transistor 12-circuit 2-wire Carrier Telephone System provides twelve 2-way high quality wide band circuits on one cable pair. Features of the system are low power consumption; out-of-band signalling, in-built carrier supplies; automatic gain regulation. On any one of the twelve circuits it is possible to employ up to 24 V.F. telegraph circuits.

STC also supplied over 200 miles of cable for this system.

STC supply many different types of multi-circuit transmission equipment for Railway Communications.





Ask for publication Z/42 "STC Products For World Railways"

COMMUNICATIONS GROUP

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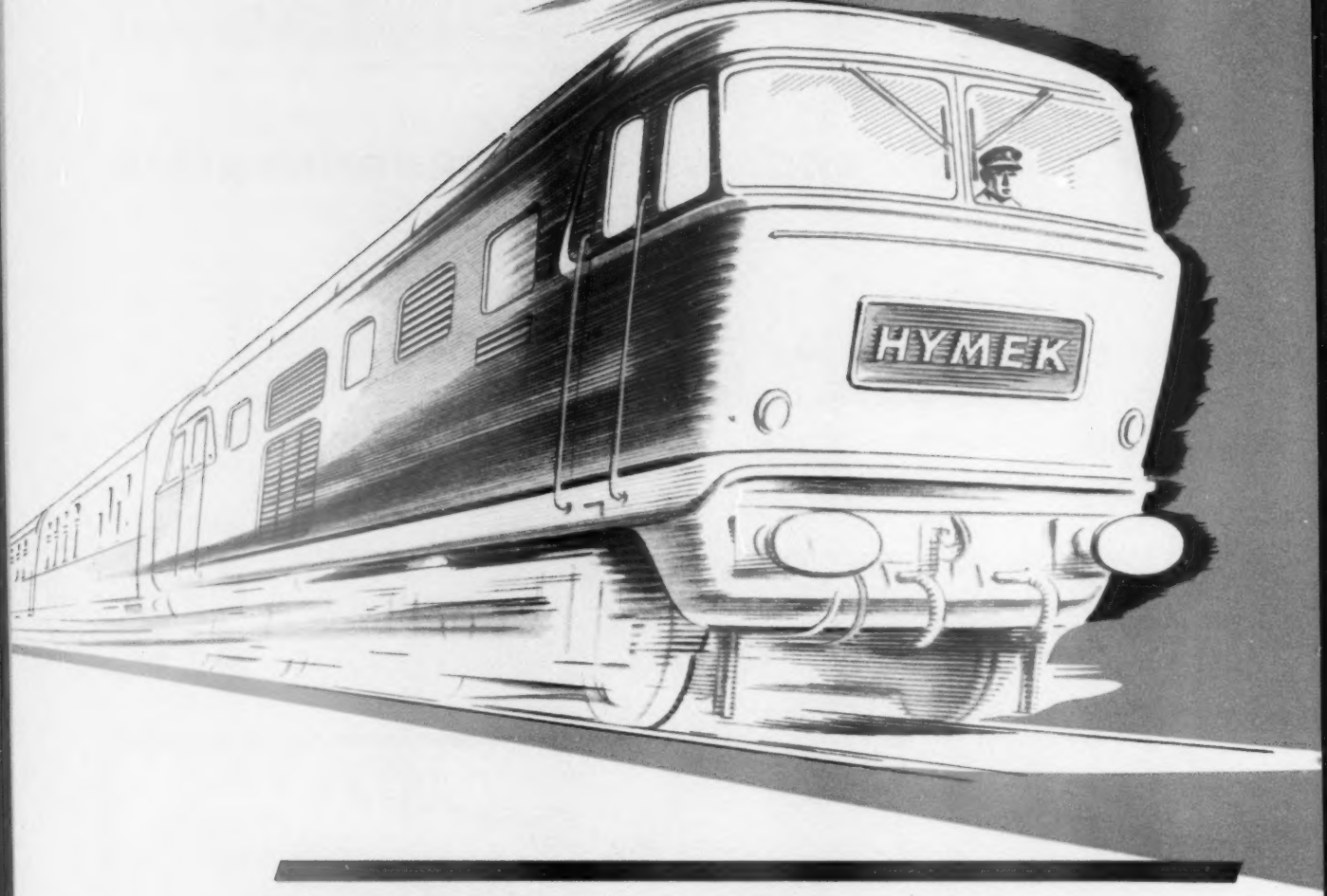
Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, London W.C.2

TRANSMISSION SYSTEMS DIVISION: NORTH WOOLWICH · LONDON · E.16



95 BRITISH RAILWAYS TYPE 3 **HYMEK** diesel-hydraulic locomotives, for main-line use, are being constructed for British Railways.

These locomotives will be fitted with Bristol Siddeley Maybach engines and Stone-Maybach transmission, units of well-known and widely-used designs, successfully proved in many millions of miles of arduous service.

The many advantages of **HYMEK** locomotives, backed by over a century of Beyer Peacock experience and craftsmanship, are attracting the attention of railways all over the world.

TECHNICAL DATA

Wheel arrangement	B-B	*Engine*	Bristol Siddeley Maybach MD 870
Wheel Diameter	3 ft. 9 in.	*Transmission box*	Stone-Maybach "Mekydro" K184U
Horsepower	1,700	*Axledrive gearboxes*	Stone-Maybach C33V and 33
Max. axle load	18·5 tons	*Starting T.E.*	49,700 lb. (30% adh.)
Total weight	74 tons	*Continuous T.E.*	33,950 lb.
Fuel capacity	800 gallons	*Max. service speed*	90 m.p.h.
		Train heating	Stone-Vapor boiler

● ***HYMEK LOCOMOTIVES***

TOMORROW'S LOCOMOTIVES TODAY

Confidence in the future...

have now ordered a further

50 Hymek Locomotives for main line

use on British Railways . . .

bringing the total

to

95 HYMEK

DIESEL-HYDRAULIC LOCOMOTIVES

ADVANTAGES

- **High starting torque**
- **High efficiency at all speeds**
- **High power continuously, if required, at low speed**
- **High performance by automatic relation of torque to load demand**
- **Low initial cost**
- **Low maintenance cost**
- **Low running cost**
- **Low weight : power ratio**
- **Maximum accessibility**
- **Minimum service routine**

BEYER PEACOCK (HYMEK) LTD.

UNITING THE RAILWAY TRACTION RESOURCES OF BEYER PEACOCK • BRISTOL SIDDELEY ENGINES • STONE PLATT INDUSTRIES

LOCOMOTIVE HOUSE, BUCKINGHAM GATE, LONDON, S.W.1

POWER

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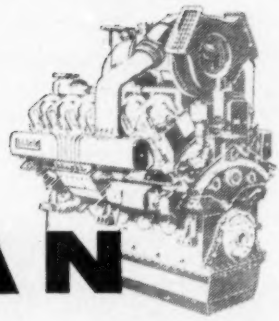

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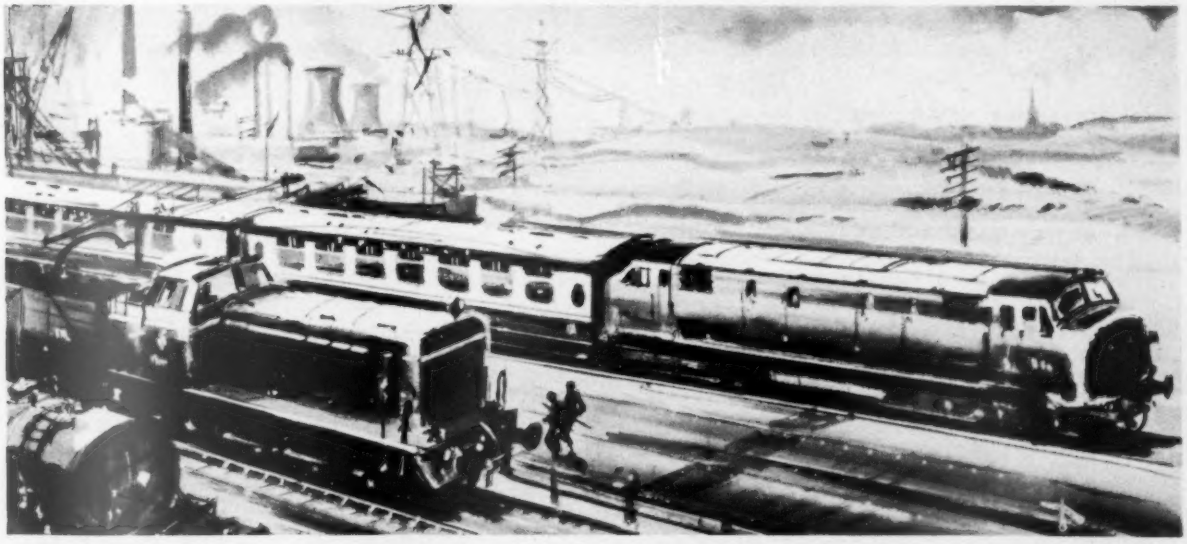

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P.R.7.

Contribution to Permanence

WATERLOO...

The crossings at the entrance to Platforms 1, 2, and 3 at Waterloo (Southern Region B.R.) are cast in one piece in Imperial Manganese Steel, and switches and many closure rails are rolled in this steel, to deal with the exceptionally heavy wear at this station.

Photographs by courtesy of British Railways

LIVERPOOL STREET...

Under the modernisation plans, the trackwork at Liverpool Street Station (Eastern Region B.R.) is being re-aligned and relaid. Edgar Allen and Company Ltd, have supplied crossings consisting of completely cast units in Imperial Manganese Steel and switches and closures in rolled Imperial Manganese Steel, of B.R. Standard 109 lb. section. These will give much longer life and need less attention and maintenance, despite the heavy traffic and new types of rolling stock now being introduced.

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INCORPORATING: THE RAILWAY ENGINEER • TRANSPORT • THE RAILWAY NEWS • THE RAILWAY TIMES • RAILWAYS ILLUSTRATED
HERAPATH'S RAILWAY JOURNAL (ESTABLISHED 1835) • THE RAILWAY RECORD • THE RAILWAY OFFICIAL GAZETTE

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CONTENTS

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Eastern Region freight modernisation

THE Eastern Region of British Railways is embarking on a £9-million freight modernisation plan which will cover the Sheffield area and will give the district one of the most modern groups of freight installations in the country. It is hoped that the work will be completed by the end of 1964. The scheme provides for a new marshalling yard at Tinsley, at which will be concentrated most of the marshalling work for the Sheffield area and will enable nine of the present eleven smaller yards to be closed. Also at Tinsley will be a diesel locomotive depot which will enable five steam locomotive depots to be closed. There will also be a freight concentration depot at Grimesthorpe, which will undertake the work now done at the Queens Road, Wharf Street, Bridgehouses, and Wicker goods stations. A further scheme, which is still being developed, is based on the concentration of fewer stations of full-wagon-load traffic now dealt with at eleven other full-load stations in the Sheffield area. The economies which are expected to accrue from the implementation of the plans about to be put into operation are of a very high order. Estimates look for savings of about 900 staff, 2,725 wagons, 27 shunting and trip engines, and 200 cartage vehicles and trailers. Operational savings are expected to amount to about £950,000 a year. At the same time, the speed-up of service throughout the Sheffield area will extend to places as far distant as London, South Wales and Tyneside. A good deal of re-signalling will be involved in the Sheffield area and here again opportunity will be taken to concentrate working.

Area management on C.I.E.

AN interesting commentary on the recently-inaugurated area system of management on the Southern Irish railway system was given recently in Limerick by Mr. John F. Higgins, the Area Manager for that division. He explained that each area manager has a large measure of automony and executives and staff to deal with commercial, operating, engineering, personnel, and accountancy matters. In general, the system is similar to the decentralisation which has operated successfully for some years in Holland and Switzerland and in industry has been put in operation by a number of very large organisations. C.I.E. has entered on an intensive commercial campaign which includes the introduction of up-to-date management techniques, the complete turnover to diesel traction, and the modernisation of goods-handling methods. On the accountancy side, it is planned that all managers will be given, on a weekly basis, a detailed analysis of their departmental expenditure and revenue. Each item of revenue and expenditure will thus, as far as practicable, be allocated directly to the person responsible for its control.

Overseas trade fairs

AS PART of the Government policy to support efforts designed to promote exports, the Board of Trade has announced an expanded programme of Exchequer aid to United Kingdom displays at overseas trade fairs. It is proposed to increase next year's provision for this purpose by £200,000 to £530,000. The Board of Trade is willing to expand the " joint venture " procedure at specialised fairs, which it had pursued for some years with trade associations, and is prepared to give similar assistance to a representative organisation in an industry which is willing to undertake the organisation of an all-British specialised fair. It will also be prepared to undertake the organisation of a British section or British pavilion if it is convinced that it is necessary; it is not in favour of the organisation of fairs on a national pavilion basis, although it recognises that this method appeals to a number of organisers and governments.

British Railways Electrification Conference

THE proceedings of the British Railways Electrification Conference, held in October last, will be published in book form next April. Bound in blue cloth covers with the conference badge and lettering in gold, and containing 125,000 words, about 120 photographs and 175 diagrams, they will cost £5

a copy, and can be ordered in advance from the Publicity Officer, British Transport Commission, 222, Marylebone Road, London, N.W.1. The proceedings will comprise one of the most comprehensive reference works obtainable about railway electrification on the 50-cycle a.c. system, and will be the first review of British technique in a.c. rail traction to be published. They will include the full text of 42 papers prepared by leading experts of British Railways and British industry, reports of discussions, and comments of the overseas engineers who, representing nearly 50 railway administrations, attended the conference. A brief account of recent difficulties experienced by British Railways with certain multiple-unit trains will be included, together with a description of the measures being taken to overcome these.

Western Region train codes

It is now possible on the Western Region of British Railways to identify trains from visual codes carried at the head of each. This "four-character train identification" system is in general use. The first figure denotes the class of train: "1" for express passenger, "2" for local passenger, "3" for parcels, "4" to "8" for various kinds of express freight, "9" for slower freight, and "0" for a light engine and brake van only. The second character, a letter, shows the area in which the train terminates its journey: "A" in the London District, "B" in the Bristol, and so on. Still more letters identify those trains which start their journey in one Region and end it in another: "E" for Eastern, "M" for London Midland, "O" for Southern (because "S" is for Scottish). The final two figures on the indicator represent the train's individual number. For example, the Down "Cornish Riviera Express" is always "30" (preceded by "1C"). The four-character identification system simplifies every reference to detailed train movement. When the new signalboxes are in operation, the codes of each train will appear on the control panel within the box.

English Electric progress

In the address by Lord Nelson of Stafford, the Chairman, at the English Electric Co. Ltd. annual meeting on March 23, he points out that during 1960 the traction activities of English Electric and its subsidiaries, Vulcan Foundry and Robert Stephenson & Hawthorns, were concerned mainly with the re-equipment of British Railways. More than 200 complete electric and diesel-electric locomotives had been delivered since the beginning of the modernisation plan. Delivery of Deltic diesel-electric locomotives had commenced and the first of these would soon undergo commissioning trials. The proposed revised planning of the modernisation programme threatened to slow-up the placing of orders and the company would have to rely more on its export sales to maintain stable employment. Lord Nelson emphasised the need for improved export credit insurance. He said that the medium-term export credit insurance period made available was often not long enough for capital goods and was too expensive as compared with facilities offered by other countries. He welcomed the Government's assurance of encouragement to export business by improved credit facilities.

Control and locking of junctions

During the past eight years the method of controlling junctions on London Transport railways has changed from use of the power frame to operation by programme machine and push button. These developments were described on March 8, in a paper read before the Institution of Railway Signal Engineers—"London Transport methods for the control and locking of junctions"—by Mr. H. W. Hadaway, Installation Engineer (Signals), London Transport Executive. Since the introduction in 1952 of desk working with push-button remote control, installations had progressively reduced the need for control by signalmen and, to date, entirely automatic junction working was in use at Camden Town, Kennington, Euston, Watford, Putney Bridge, and Parsons Green. During this time, 17 push-button installations had been put in use; 77 routes were being operated by programme machines and 575 were exclusively operated by push button. It might be supposed that there was little left in the subject of locking, but this was not the case with present methods of route working and some examples had been selected for explanation. In power signalling installations, safe traffic working ultimately depended on track circuit reliability, and it was unlikely that the track circuit would cease to be the solid foundation on which such signalling systems would be founded. Mr. Hadaway referred to the hazard of "bobbing," which could produce the release of a route and to the safeguards introduced to overcome this risk. He also described various types of junction locking and releasing in use.

Improvement in London bus services

A definite and encouraging improvement in the bus staff position has been reported by Mr. A. B. B. Valentine, Chairman of the London Transport Executive, in the current issue of the *London Transport Magazine*. Mr. Valentine stated that the most important factors governing the quality of services was the staffing position and road congestion. The staff situation had improved since the recent wage increase, but road congestion, so far from getting better, was worsening. Travel on the Underground had increased during the past year: to relieve peak congestion, London Transport was pushing ahead with a £40-million modernisation programme which included the replacement of half the present train stock. This would be completed within three years. It was essential to build the Victoria line—this would have the transport potential of five six-lane motorways through the heart of London and out to the north-east.

Bulk transport of fuel oil

The prototype tank wagon described in this issue and demonstrated last week to railway and oil company representatives, is intended for fast haulage of fuel oil at highly-competitive rates. The high payload to tare weight ratio of approximately 3 : 1 results from an integral barrel and underframe construction and extensive use of light-alloy material. Basing calculations on a vehicle life of 800,000 miles, capital plus repair cost is estimated to be the equivalent of 1/33d. per ton-mile. Gross tank capacity of 7,500 gal. is obtained with an axleload of 20 tons, a somewhat higher figure than the generally-accepted limit. The manufacturer, Chas. Roberts & Co. Ltd., considers that the economic advantages of fast bulk transport will secure a wide acceptance of this axle loading. If the prototypes prove successful under tests, it is intended that Tank Rentals Limited, a subsidiary of the manufacturer, will offer these vehicles for hire.

Overland transport from Spain

Since 1958, there has been a 50 per cent increase in exports by rail of fruit and vegetables from Spain in wagons of the Spanish company Transfesa. These vehicles, which were introduced in 1951, are fitted with interchangeable axles to overcome differences in railway gauges between Spain and the rest of Europe. The British Transport Commission, which has no financial interest in Transfesa, recognises the stimulus to freight traffic which it provides and, in 1954, Mr. S. J. Pickard, Administrative Assistant to the Commission's Chief Shipping & International Services Officer, was seconded in a part-time capacity to act as the company's representative in Britain. In that capacity, he attends to the administrative side and serves as a liaison officer between Transfesa and British Railways. All commercial matters are handled by Transfesa

(U.K.) Limited, a consortium of the principal forwarding agents engaged in the import of Spanish fruit and vegetables in this country. The avoidance of transhipment at the franco-spanish frontier, speedier transits, improved techniques in standards of refrigeration, increased living standards in most European countries, greater productivity, and liberalisation of exchange controls have all contributed to a constant growth of traffic between 1951 and 1957, and it was expected at the time that this growth would continue. Transfesa placed orders for 1,000 wagons to the English loading gauge.

During the years 1958, 1959 and 1960, Transfesa wagons have conveyed the following tonnages (in metric *tonnes*) to individual destination countries:

Country	1958 tonnes	1959 tonnes	1960 tonnes
Germany	122,034	146,235	176,909
England	42,999	44,026	69,060
Belgium	34,893	41,085	62,088
France	31,685	16,704	24,160
Switzerland	16,515	14,678	22,895
Austria	11,695	13,851	16,201
Czechoslovakia	1,102	2,571	8,576
Holland	1,052	1,104	7,306
Scandinavia	1,816	7,092	7,138
Italy	891	980	1,824
Totals	264,682	288,326	396,157

It will be observed that total traffic has increased by almost 50 per cent in 1960 as compared with 1958, and although Germany remains by far the principal destination country for Transfesa traffic, the greatest percentage increases have been in traffic to Czechoslovakia (678 per cent), Holland (594 per cent), Scandinavia (293 per cent), Italy (105 per cent), Belgium (78 per cent), and England (61 per cent), whereas to Germany the percentage increase has been only 31 per cent. The only country whose traffic has fallen has been France, although a partial recovery was made in 1960. Insofar as commodities are concerned, the following table illustrates the position:—

Commodity	1958 tonnes	1959 tonnes	1960 tonnes
Citrus Fruit	185,123	204,395	288,171
Grapes	26,253	37,070	35,550
Tomatoes	21,544	19,618	32,323
Potatoes	12,313	12,737	18,149
Apricots	12,264	9,714	9,852
Salads	2,006	1,662	4,713
Other fruits *	4,236	3,130	4,618
Onions	943	—	2,781
Totals	264,682	288,326	396,157

* Pomegranates, apples, melons, water-melons, plums, peaches, pears, cherries, and bananas

The three principal commodities exported from Spain are citrus fruit, grapes and tomatoes and it is not surprising that these meet the greatest competition from direct sea transport. In spite of this competition, percentage increases in 1960 over 1958 have been citrus fruit (56 per cent), tomatoes (50 per cent) and grapes (35 per cent). The United Kingdom has been most affected by the increase in tomato traffic for Britain is the principal importer of Alicante tomatoes and the setback in 1959, resulting from intensive sea competition, was overcome in 1960 by improved service and speedier transits by the overland route.

Other commodities, although relatively smaller in tonnages conveyed, also made exceptional percentage increases: salads (135 per cent) and potatoes (47 per cent), and a strenuous effort was made to capture the onion traffic to the overland route, with 2,781 *tonnes* secured in 1960, 2,601 *tonnes* of these being consigned to England. Apricots were the only commodity to show a fall but this resulted from crop failure rather than any deficiency in the transport service.

Another important factor to be taken into consideration is the average load per wagon. It is in the interest of all concerned —sender, importer, railway administrations and Transfesa—to obtain the maximum load per wagon and the freight rates are geared to encourage maximum loading. Transfesa has co-operated by specifying minimum tonnages to qualify for the supply of wagons to senders. The results obtained are shown in the following table which relates to traffic to England during the past four years or corresponding seasons.

Export	1956/57 season or 1957 year	1957/58 season or 1958 year	1958/59 season or 1959 year	1959/60 season or 1960 year
Citrus	16·65	17·12	17·30	19·98
Tomatoes	14·80	15·18	15·09	15·26
Grapes	10·85	11·97	13·34	13·78
Potatoes	19·00	19·75	20·44	20·89

In four years, the average wagon-load of citrus fruit has increased from little over 16½ *tonnes* to almost exactly 20 *tonnes*, that of grapes from under 11 *tonnes* to nearly 14 *tonnes*, and potatoes averaged nearly 21 *tonnes* per wagon in 1960 compared with 19 *tonnes* in 1957. The policy of Transfesa in building large-capacity wagons with an intermediate floor to permit loading at two levels has been amply justified.

The opening of British Railways' railhead at Hither Green inevitably will provide an added stimulus to the overland route; speedy transits by special trains entirely made up of Transfesa wagons in Spain and across Europe must encourage traffic; greater governmental control of the quality of exports from Spain will ensure an expanding market; the construction by the Interfrigo Company of 100 modern refrigerator wagons adaptable for use with interchangeable axles for the direct transport of Spanish soft fruits will provide additional rolling stock, and the policy of reducing costs by the overland route adopted by the railway administrations and Transfesa will encourage existing traffics and attract new.

Ghana Railway & Harbours report

A COPY of the report for 1958-59 of the Ghana Railway & Harbours Administration has been sent to us by Mr. H. F. P. Plumridge, who was then General Manager & Harbours Authority. During the year there was a return to moderately satisfactory results. The combined operating surplus rose from £G702,238 to £G1,312,434, to which the Railway contributed £G734,881, Takoradi Harbour £G510,708, and other ports and lighthouses £G66,845.

After paying renewals contributions, interest and sinking fund charges, there was an aggregate net surplus of £G310,363, comprising £G7,524 from the railway, £G253,939 from Takoradi Harbour, and £G48,900 from other services. This enabled the Takoradi Harbour general reserve to be raised to £G100,000, and the appropriation of £G150,000 to Takoradi Harbour Betterment. The sum of £G50,000 was placed to Railway Betterment, but there is still no railway general reserve.

Below are some of the principal results:—

	1957-58	1958-59
Railway—		
Goods tonnage	1,846,195	1,694,538
Passengers	5,189,427	5,198,612
	£G	£G
Goods receipts	2,746,443	3,233,778
Coaching receipts	635,266	614,130
Total gross receipts	3,527,951	3,997,414
Operating expenditure	3,353,763	3,262,263
Surplus of receipts	174,188	734,881
Net earnings	389,852	127,216
Takoradi—		
Revenue	1,088,915	1,211,689
Expenditure	629,119	700,983
Other Ports, and so on—		
Revenue	174,711	190,484
Expenditure	106,457	123,639

The improved railway result flowed mainly from higher cocoa railings (up from 155,925 tons to 176,649 tons), and to the sustained increase in timber traffic to a new peak of 638,616 tons. That the railway net surplus was so disappointingly small, and £G87,866 under estimate, was in the main because of the unforeseen expenditure of £G109,365 in respect of accumulated leave of Government civil servants commuted for cash. There was a slight increase in the number of passengers carried, but the average length of journey declined and coaching revenue did not reach the 1957-58 level.

Takoradi Harbour again showed increased activity, and new records were created, operating revenue attaining a peak of £G1,211,690. Very good progress was made during the year with the construction of Tema Harbour, near Accra.

Machine-accounting for the pay-roll has been extended to include for each main department, complete monthly lists of adjustments affecting the abstracts under its control soon after the closing of the monthly accounts. By the end of 1960 it was expected that additional machines would enable the incorporation of workshop costings, marine and works suspense accounts, and railway statistics.

Total engine mileage of 4,078,731 was 0·85 per cent below 1957-58 because of the cancellation of some of the less essential trains as a result of general water shortage. There was a total of 891 failures during the year, a jump of just on 60 per cent on the 557 failures in 1957-58. By far the largest part of this big increase was ascribed to collisions and derailments, where the number of failures shot up from 32 in 1957-58 to 352 in 1958-59. Mr. Plumridge comments that some of this sharp increase was due to staff negligence, " which has been severely dealt with." In railway workshops, renewals of tyres, axles, and crankpins were particularly heavy, and in all cases were over double those replaced in the previous year. A record number of cylinder liners were also fitted during the year.

Diesel working in Malaya

THE Malayan Railway now has 64 units in its diesel stock. These consist of 20 350-h.p. diesel-electric shunters, introduced in 1948 ; six 300-h.p. diesel-hydraulic shunters, introduced in 1955 ; 26 1,500-h.p. diesel-electric locomotives, introduced in 1957 ; and 12 420-h.p. diesel railcars, introduced in 1958. In the 10-year period it has been possible to reduce the steam stock from 216 locomotives and 11 steam railcars to 121 steam locomotives, while the annual engine mileage has increased by 47 per cent to 6.65 million, train mileage by 85 per cent to 5.3 million, and the average freight train weight by 17 per cent to 380 tons. The 1,500-h.p. diesels now perform 42 per cent of the train mileage, and represent 19 per cent of the train locomotive stock. Their power has resulted in the maximum weights of goods trains being increased from 475 tons to 800 tons on most routes, while in certain sections iron ore trains of up to 1,070 tons are being hauled.

In 1957-58 express passenger trains were accelerated in the daytime by between ¼ and 1½ hr. and at night between ½ and 2 hr., for the journeys between Kuala Lumpur, Singapore and Prai. This was possible because of the termination of the emergency and a return to the maximum permissible speed of 45 m.p.h., as well as the increased acceleration possible with the diesels. Banking over the Taiping Pass section, formerly necessary with all trains over 150 tons, has been reduced to only those freight trains which are over 650 tons, and all passenger trains now run straight through this hill section of the main west coast line.

The diesel railcars are used for all passenger services on the Teluk Anson branch line, and two services between Ipoh and Kuala Lumpur connecting with express passenger trains. The former, previously worked by mixed passenger and freight steam trains, has been accelerated from five trains at 61 minutes to eight trains at 40 minutes, with stops at all stations. The freight portion is worked by separate steam-hauled goods trains.

The diesel electric shunters are distributed at the main marshalling yards throughout the line, and the diesel hydraulic shunters are concentrated at Port Swettenham, the principal railway owned docks serving central Malaya.

Malaya's main exports are tin and rubber. Tin suffered a depression in 1958 which affected the country's trading and caused a discernible drop in traffic for that year and 1959, while 1960 showed increases over the pre-1958 period. Punctuality decreased slightly in 1960, due to the increased traffic, tighter schedules, heavier trains and track relaying.

Financial savings have been effected primarily by the reduction in fuel costs with the diesels, to a secondary degree by the reduction in repair costs, and closure of some of the minor running sheds.

Half-scale bridge tests

IN our issue of June 20, 1958, we published an article describing a half-scale model of a 200-ft. through-truss Warren girder bridge span specially constructed for research at the Northwestern University, Illinois, U.S.A. It may be remembered that this test plant, with its 100-ft. actual-length span, was sponsored jointly by the University, the Association of American Railways, the Corps of Engineers and the Bureau of Public Roads, and the project was and is also assisted by many interested business concerns.

The test-span is primarily designed as a model of a double-line railway bridge, but it is also convertible as a road bridge. The span has Warren-trusses with verticals 16 ft. deep and spaced at 16 ft. 3 in. centres; there are eight 12-ft. 6-in. panels. All joints are made with high-strength bolts. The span has interchangeable members of both mild and high-tensile steel and of various designs. During these tests one of the trusses had members of traditional cross-section and a box-section top chord. The other had inward-turned angles and ovaloid perforated cover plates. The whole superstructure rests indirectly on a heavy R.C. test-bed anchored by 18 4-ft. screw caissons taken down 72 ft. to rock.

As envisaged in the article quoted above one of the earliest tests was planned so that two end-posts of the bridge could be tested to destruction without damage to the remainder of the structure. Accordingly, the high-strength steel end-posts were replaced by others of carbon steel having a yield-point of 35,000 lb. per sq. in., whilst the remainder of the truss-members remained in medium manganese steel with a 55,000-lb. yield-point. A double-line railway-type deck in mild steel was used.

The test lasted eight hours, during which exhaustive instrumental observation of the two test-members was maintained to disclose their behaviour at all stages of loading, deflection, and buckling. The loading was applied by a system of 14 150-ton inverted hydraulic centrally-controlled and operated jacks. One pair at each panel-point loads the stringers to simulate railway loading. All the jacks are supplied by two hydraulic circuits running all round the structure. Different pressures can be maintained in the two circuits and any jack can be connected to either in order to exert various loads.

In the recent test the two carbon-steel end-posts failed under a load equivalent to two double-headed trains both running across the span towards the portals under test. Under these conditions the design load at the critical panel point exerted by each jack was 55,000 lb. and that at each of the remaining 10 jacks 40,000 lb.; the total load was 620,000 lb.

The effects of this and subsequent loads were measured with strain-gauges at critical points on all structural parts of the end-posts and their connections, and longitudinal strains in each post were measured by an electronic strain-recorder and also by an optical gauge reading to $\frac{1}{1000}$ in. By a system of piano wires and optical instruments the rotations and translations of the top and bottom points of each post were recorded. Changes in the elastic curves of each post were also measured with wires and steel scales reading to $\frac{1}{100}$ in.

The deflection of the end floor-beam, the elongation of the lower truss-chords, and the deflection at the centre of the span, as well as movements in other parts of the structure were also noted with the aid of $\frac{1}{1000}$-in. dial-gauges.

After the effects produced by the design load had been duly recorded, loading was continued to test the end-posts to failure; the behaviour of the posts and their connections was measured under each increment of load. A calculated deflection was allowed for each increment, and limit-switches were set to ensure that this was not exceeded by preventing any further increase of load while maintaining that applied at the time.

Moreover, the limit-switches were responsible for indicating the criterion of failure when the span continued to deflect without any increase in load, a condition in which the end-posts were considered to have failed.

Failure occurred at exactly three times the design load, or under jack-loads of 165,000 lb. and 120,000 lb., the total load on the structure being 1,860,000 lb. Practically the only visible major signs of failure were the inward buckling of the gusset-plates at the toes of the end-posts, a permanent deflection at the centre of the span, and slight damage to the cross-bracing between the stringers near the end floor-beam. There were, however, clearly-defined lines on the surfaces of both posts showing that the metal had been stressed beyond the elastic limit.

Though final detailed conclusions as to exactly what occurred must await further examination of the vast amount of data collected, preliminary analysis indicates that the end-post with the box-section top chord may have failed by twist-buckling. The other end-post also appeared to have been very near failure. An important side-issue is that there was no apparent slip in any of the bolted joints.

Apart from the excellent co-operation in this test-plant between education, government, railways, and other industries, it should benefit mankind by providing comprehensive facilities for the more efficient and economic design of long-span bridges, rail and road, in all countries.

Queensland Railways in 1959-60

MR. G. V. MORIARTY, Commissioner for Railways, Queensland, in his annual report for the year to June 30, 1960, a copy of which he has sent us, records a total deficit of £6,587,521, including interest charges of £3,959,984. The Commissioner stresses that Queensland is largely a primary producing State, and that therefore railway revenue is dependent on seasonal conditions. The prolonged drought, for instance, had serious repercussions in the cattle industry, and revenue from the carriage of cattle fell by £912,454 although livestock traffic as a whole was only £791,274 lower because additional earnings were received from the movement of sheep. Other reductions were £278,233 less from the carriage of grains other than wheat and maize, and a drop of £191,000 in the quantity of sugar moved because of the higher sugar content of the cane which enabled the mills to produce their approved quota with the crushing of much less cane and in a shorter period.

The following are some of the principal operating results:—

	1958-59	1959-60
(a) 3-ft. 6-in. gauge lines:	(Thousands)	
Passenger journeys	33,306	32,197
Passenger train miles	6,847	6,754
Goods tonnage carried	8,061	7,747
Goods & mixed train miles	12,415	12,020
	(£A Thousands)	
Passenger parcels, etc., receipts	2,630	2,418
Goods traffic	29,493	29,420
Total earnings	35,336	34,856
Working expenses	36,594	37,483
(b) 4-ft. 8½-in. gauge lines:		
Passenger journeys	178	172
Goods tonnage carried	398	464
	(£A Thousands)	
Total earnings	833	815
Working expenses	823	780

Gross earnings of £34,855,601 were £480,418 lower, but if seasonal conditions had been favourable and grain and cattle traffic had been maintained at 1958–59 levels, gross earnings would have been £700,000 more. Working expenses rose from £36,593,938 to £37,483,138, to exceed earnings by £2,627,537, or double the previous year's gap. An increase of £889,200 in working expenses would have been much greater had the Department not been able by various savings to offset additional unavoidable expenditure of £1,029,056 arising from higher wages. Working expenses were debited with relaying (£1,052,378), payroll tax (£681,127), and demolished assets (£396,941), and part of the additional pay period (approximately £600,000), an aggregate expenditure of £2,730,446 compared with the excess expenditure of £2,627,537.

Passenger traffic declined, the number of journeys falling 1,108,065 to 32,197,469, and earnings by £196,277 to £3,017,248. Mr. Moriarty records that the introduction of television in Brisbane has led to fewer night journeys, and services have been reduced. From December, 1960, rail motors were being substituted for steam or diesel-hauled trains on the Ferny Grove, Petrie, and Pinkenba suburban lines on Sundays, enabling station staffs to be cut out. Guards were responsible for collecting fares.

In comment on the world-wide decline in passenger rail traffic, Mr. Moriarty says it reflects the changing economic pattern which in nearly two decades of unprecedented prosperity has seen a tremendous growth in airways development and an ever-increasing number of private motor-cars. The continuance of loan funds is vital if rail services are to be developed to the stage of efficiency whereby greatly increased numbers of people can be encouraged to travel by rail. It is essential, he emphasises, that Brisbane suburban railways should be developed as those in Sydney and Melbourne have been, where traffic conditions would be chaotic were it not for the highly developed suburban system. Uneconomic competition between tram, bus, and rail services in Brisbane must be ended by proper co-ordination.

The most pleasing aspect of goods traffic was a gain of £651,227 to £11,019,127 in earnings from first and second-class merchandise, which constitutes 45 per cent of total goods revenue. A substantial rise accrued from the carriage of wheat and other minerals, the tonnage of wheat going up 102,774 tons to 380,726 tons and earnings by £313,987 to £1,120,345. "Other minerals" moved yielded £297,660 more at £2,867,670 because of higher railage of products from Mount Isa Mines.

Total traffic train-miles run were 18,784,524, compared with 19,262,708. The average gross load of trains improved from 339 tons to 353 tons, principally because of the operation of diesel-electric locomotives, the average gross load hauled by these locomotives having progressively increased from 439 tons in 1957–58 to 471 tons in 1959–60. Overall, more work was done with the running of fewer train miles.

The total number of locomotives on the books at the end of the year was 743 steam, 63 diesel-electric and seven diesel-mechanical, after 11 obsolete locomotives had been written off. The length of trains has been considerably increased, and although the crossing facilities are not available for two-way working, trains are now being made up to lengths of 90 units as against 60 and 70 units.

The only new carriages added to the stock during the year were three air-conditioned cars constructed in the Ipswich workshops, two second-class sleeping cars and a second-class sitting car. The Department has on order 91 stainless-steel suburban cars, delivery of which should start in June, 1961. During the year 20 old carriages were written off. New wagons placed in service totalled 229. The current wagon construction programme includes the building of 100 bogie cattle wagons. During the year 570 wagons were condemned and written off, the highest number yet in one financial year. Eight wagons have been converted from ice-cooling to diesel-mechanical refrigeration.

In a note on the shortening and elimination of timber bridges, the Commissioner points out that over the years when railways were being constructed in Queensland hardwood was plentiful, enabling construction costs to be kept to a minimum. But the increasing age of these timber structures and the progressively heavier burden of maintenance and denudation of hardwood forests have made the Department embark on a policy of gradual elimination of timber bridging. So far 2,781 timber spans of an average length of 18 to 20-ft. have been replaced, and approval has been given for a further 2,371 spans to be eliminated. Where practicable, replacement is by concrete culverts or steel and concrete structures. In several cases bridges are being shortened by building embankments to replace a portion of the bridge, but leaving a waterway sufficient to cope with the watershed area.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

RAIL TRANSPORT TO LONDON AIRPORT

February 24

SIR,—Referring to the paragraph in your issue of February 24 that Lord Douglas of Kirtleside, Chairman of B.E.A., is not convinced that the monorail is the final answer, may I say that, if the existing Underground service were extended from Hounslow West to London Airport, this would give rail access to the airport from all parts of London and its surroundings. "Air Specials" could be run outside the peak hours and baggage trains during the night. The air terminal at Cromwell Road would not be required, as London Airport would become the centralised dispatch and arrival point.

With regard to the suggestion of a loop line from Feltham to Waterloo; not everyone would want to go to Waterloo, whereas the extension from Hounslow West would give connections to all parts of the metropolis.

Yours sincerely,

ROBERT W. LEWIS

"Beth-El,"
104, Leggatts Way,
Watford, Herts.

RAILWAYS INTO ROADS

March 4

SIR, In view of the time that will elapse before the present modernisation plan is completed, and the difficulties experienced in keeping traffic moving during the process, the idea of converting the railways into roads cannot be dismissed on the grounds of troubles met during conversion, although they will be bad enough. We must try to imagine final results, and to do this we can look at the United States, said to be 20 years ahead of us in road construction.

There, a modern development appears to be the speed limit, Throughout the United States and Canada there seems to be no limit higher than 70 m.p.h., this being exceptional : on the majority of roads, it is 60 or even 50. Cars capable of 140 m.p.h., therefore, are restricted to half that speed by legislation, which is based on a recognition of natural circumstances.

In the railways-into-roads plan, no consideration seems to have been given to the effect of such limits on overall schedules, which will mean start-to-stop averages of 50 m.p.h. or less, that is, a reversion to the era before 1895. In some cases, the recession will be even worse : the Great Western Railway ran a train over the 53 miles between Paddington and Didcot in 57 min. as long ago as 1847. It hardly seems credible that a scheme entailing the expenditure of millions, which would put the clock back by over 100 years, should ever have received serious consideration.

France and the United States have trains averaging 80 m.p.h. start-to-stop, and most European countries are expanding with 100-m.p.h. locomotives; the Japanese are engaged in building a *new* railway on which speeds of 150 m.p.h. are contemplated, with start-to-stop averages which would bring Edinburgh within 4 hr. of London. Also, as France has successfully exceeded 200 m.p.h. on test, an exciting prospect lies before countries which are developing their railway systems. With our industrial competitors availing themselves of these facilities, the question is not whether we can afford them, but whether we can afford not to have them.

Although the motor has won a unique position in transport, a stage has been reached when it must be questioned whether a rubber-tyre, hand-steered vehicle running on smooth surfaces, is a suitable medium for speeds greatly in excess of 60 m.p.h. outside the race track. The merits of motor transport are self-evident, but we seem to have reached a stage where we are trying to strain it beyond its natural sphere. In these matters, we must not allow ourselves to be swayed by sentiment, but must advance by the diversion of the national capital into the construction of modern, high-speed, all-weather rail routes.

Yours faithfully,

A. W. T. DANIEL, M.A., PH.D., A.M.I.C.E.

3, Hallway,
Purley, Surrey

BOUQUET FROM AMERICA

March 2

SIR, I have just reviewed your February 10 issue and wish to compliment you and your staff responsible for the improvement in the "personal" section.

I find that the use of distinctive type to separate the names of persons from the balance of the text is eye-catching and facilitates greatly in scanning and reading this particular section. An added help is the division into Industrial, British Transport Commission, British Railways, and Overseas Railways sections.

Since the duty of reading over this section and keeping up to date on all personnel changes in Railway Industries is one of my responsibilities, this new format helps immensely in doing a faster and thorough job.

Thank you very much.

Yours faithfully,

JOHN BOHONIS
Foreign Sales Engineer

W. H. Miner, Inc.,
Pennsylvania Building,
425 Thirteenth Street, N.W.,
Washington 4, D.C.

INTER-REGIONAL PASSENGER SERVICES

February 28

SIR, Gilbert Dalton's letter in your February 24 issue on cross-country connections for the Channel Islands services is timely: we are very much aware of the deficiencies and are at this very moment examining the timetables to see what improvements can be made.

Yours faithfully,

F. D. Y. FAULKNER

Public Relations Officer,
Southern Region, British Railways

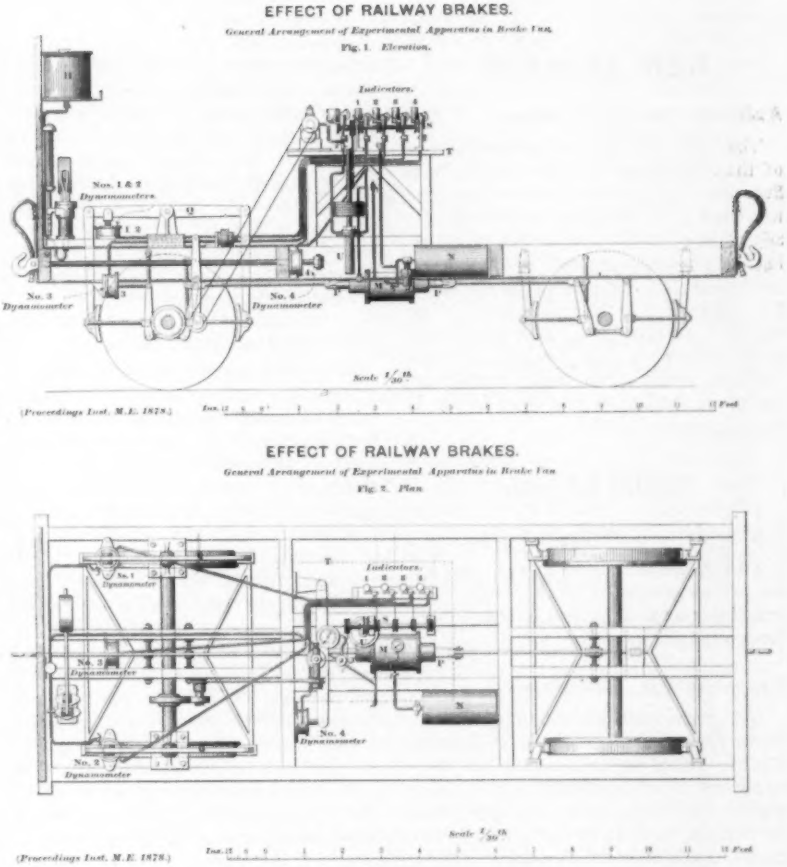
GUEST, KEEN & NETTLEFOLDS AT OLYMPIA

On its stand at the forthcoming Engineering, Marine Welding & Nuclear Energy Exhibition at Olympia, Guest, Keen & Nettlefolds (Midlands) Limited will show an addition to its existing range of high-strength friction grip bolts. This will be the Load Indicating Bolt, which provides visual indication that a specified minimum tension is reached during tightening. Also on exhibit will be weld nuts which, when welded on sheets, provide a permanent tapped hole in places difficult of access. Together with a wide range of Wedglok screws and nuts, there will be a special panel exhibiting high-quality bolts, push-rods, and types of corrosion-resistant fasteners. There will also be a special display of high-strength friction grip bolts and torshear friction grip bolts.

The Scrap Heap

Early brake dynamometer

Sponsored by the Institution of Mechanical Engineers, a series of experiments was carried out by Captain Douglas Galton in 1878 to demonstrate that wheel skid during braking could be eliminated by a progressive reduction in the shoe loading. These experiments, which were recorded in " The Effects of Brakes upon Railway Trains " by Captain Douglas Galton and reprinted by the Westinghouse Air Brake Company in 1894, were conducted with the aid of an ingenious hydraulic dynamometer (illustrated on this page). Designed by George Westinghouse, Jnr., and installed in a brakevan loaned to the Institution by the London Brighton & South Coast Railway Company, it took autographic recordings of the retarding force on the wheels, load on the brake shoes, and drawbar pull. The force to be measured was transmitted to a hydraulic piston and the resulting water pressure was recorded on a Reynolds indicator inside the van. A water clock was used to drive the indicator recording drums. Only one pair of wheels was braked and wheel slip was shown by the speed variation between the braked and the unbraked wheels. In 1960, automatic two-stage braking was introduced on the diesel-electric Pullmans!



Plan and elevation of early brake dynamometer car

Ruskin on railways

Replying to a Cumberland man who had communicated with him respecting the Ambleside Railway project, John Ruskin wrote : " Brantwood, Coniston, Lancashire, March 1, 1887. My dear Sir, I do not write now further concerning railroads here or elsewhere. They are to me the loathsomest form of devilry now extant, animated and deliberate earthquakes, destructive of all wise social habit or possible natural beauty, carriages of damned souls on the ridges of their own graves. Ever faithfully yours, John Ruskin."

Diogenes of the railway works

In this column we have had two references to the railway employee who gave in his notice because he felt that he had not enough work to do to justify his pay from the railway, and have stated that he was employed at one of the British Railways carriage & wagon works. We are assured by Mr. A. E. Bates, Works Manager at Derby, that the man in question was employed not in his but in another department. We also have to record that Mr. Bates has written to us previously on this point and is very put out because we have repeated the daily paper mis-statement. For our part, we must confess we had not thought the matter of more than passing amusing interest, but we are quite prepared to accept the inference of Mr. Bates's letter that there are no persons of this kind in the Derby Carriage & Wagon Works. Lest we should receive a similar letter from the head of another Derby department which is named by Mr. Bates, we will not enlighten our readers as to the kind of work this particular employee was not doing.

Exit dobbin

I record the ending of a long and rather splendid chapter in this country's transport history. The British Transport Commission has sold the last of its horses. They had a good run. Up to three years ago they were still a common sight in London's choked streets. They hauled carts. They were used on shunting duties. And they won many awards at the Regent's Park parades. But they were an anachronism. They were sold by auction for use on farms or for some lighter type of work.—" *John London* " *in* " *The Evening News*."

Covering fire

George Stephenson's survey for the route of the proposed Manchester-Liverpool railway was attended by hazards that would have discouraged a less determined man. The most serious impediment to his work was the aggressive measures adopted by Captain Bradshaw, the canal manager, who organised bands of armed peasants with orders to shoot on sight any stranger whom they suspected of being a surveyor. To combat this menace, Stephenson recruited a small army of assistants and resorted to an ingenious but simple strategy. Making use of moonlit nights, he deployed some of his force to engage and decoy the gallant Captain and his men, while the remaining surveyors carried on quietly with their work.

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

NEW ZEALAND

Assistance from railway unions

The hope that the biennial conference of the Amalgamated Society of Railway Servants would devote some of its time to means of assisting the railways generally and not all its time to ways of boosting wages, was expressed by Mr. J. K. McAlpine, the Minister of Railways, in his address to the conference. The Minister warned the conference that some workers in New Zealand, particularly the miners, had priced themselves out of the market by continual demands for wage rises.

ARGENTINA

U.S. investment in locomotive plant

The Argentine Government has approved investment of $U.S. 1,839,270 in machinery and equipment for the Cometarsa plant at Campana.

General Electric—Fiat agreement

In a recent interview with the President of the Republic, high officials of General Electric and Fiat announced that they had come to an agreement for the joint establishment of a completely new plant for the construction and repair of diesel-electric locomotives. This plant will be unconnected with the Materfer plant in the province of Córdoba, where diesel railcars are already being produced. The new plant will be the first of its kind in Latin America and will provide service, spare parts, and technical advice as well as the actual building of locomotives. The proposal has been made after consultation with E.F.E.A. and an offer to build 110 units has been put forward; these to have a minimum of 60 per cent of Argentine materials.

Roca Railway suburban services

The increasing number of breakdowns and growing unpunctuality on the Buenos Aires suburban services of the General Roca Railway is ascribed by the management to shortages of motive power and rolling stock. The number of steam locomotives available is stated to be 38, out of a minimum requirement of 50, and that of coaches to be 200, out of 350. Trains are being formed of five or even three coaches when eight are needed for the traffic. To improve the situation, 17 up and 17 down trains have been cancelled, but the results have been negligible. The railway unions have declared that this state of affairs is not due to industrial trouble and that the men are doing their best in adverse circumstances. The only immediate possibility of improvement, according to official announcements would be on placing in service of some of the new Fiat O.M. railcars now in course of delivery.

Some examples of silk screen work produced by Rhodesia Railways

BRAZIL

New Mogiana line

Construction of the Uberlandia to Araguari deviation of the Mogiana Railway has been approved, to accelerate movement of traffic and complete the connection to Brasilia, the new Federal capital. The cost is estimated at cr. 100 million.

RHODESIA

Silk screen work

Besides transfers, posters, destination boards and notices of many kinds the silk screen reproduction process is used in textile printing and specifically by Rhodesia Railways for marking bed sheets, pillow cases and blankets. The illustration below shows some examples of silk screen work.

Centralised train control

Rhodesia Railways recently completed the introduction of centralised train control over the 301-mile section between Bulawayo and Livingstone, one of the longest lines under this type of control in the world. Work is also being pushed ahead rapidly on the other sections.

Increase in mineral traffic

Rail traffic (mainly of copper and zinc) from Katanga over Rhodesia Railways lines to east coast ports has increased considerably since independence of the Congo Republic: much of this traffic was formerly routed to the west coast.

ITALY

Re-opening of passenger line

Passenger service has been resumed on the short international railway linking Gorizia Centrale with Nova Gorica (formerly Gorizia Montesanto) in Yugoslavia. This line has been closed to passenger traffic since the division of Istria between Italy and Yugoslavia in 1945.

DENMARK

New electrified line

A new electrified line will be opened in Denmark in 1962. It is an extension of the electrified S-Train-Net of Copenhagen. The new line will be from Glostrup to Taastrup. The main line over Zealand from Copenhagen to Korsoer

passes these two suburbs, but the traffic is so heavy that further trains cannot be accommodated. The new track is therefore being built to carry the electric trains.

NETHERLANDS

Increased train services

With the introduction of summer services on May 28, the service on the 65-mile main line from Amsterdam to Dordrecht *via* The Hague and Rotterdam will be increased to three trains an hour throughout the day, Sundays included. This figure does not include the international expresses and boat trains which also traverse this section. The Rotterdam-Eindhoven-Roermond section will have two trains an hour instead of one. As a further improvement to facilities, through services will be introduced from Amsterdam to Venlo, Nijmegen to Eindhoven, Rotterdam to Maastricht, and Amsterdam *via* Utrecht and Breda to Roosendaal.

HUNGARY

International Measurement Conference

The 1961 International Measurement Conference will be held in Budapest. Detailed information, and invitation to the Conference may be obtained from the I.M.E.K.O. Secretariat, Budapest 5, P.O.B. 3.

PUBLICATIONS RECEIVED

Party trips in the Scottish Region. An illustrated booklet "Party Organisers' Guide," issued by the Scottish Region of British Railways, and obtainable at stations in Scotland, suggests itineraries for trips by train and steamer, or combined train—steamer—motorcoach journeys. The information includes the procedure for hiring a Clyde steamer or the special train equipped with television, and details of refreshment facilities. The illustrations show the television train besides the scenic attractions of suggested destinations.

Motorcars via Harwich and the Hook. An illustrated folder issued by British Railways, Eastern Region, describes facilities for transport of motor cars, motorcycles, and caravans by the Harwich-Hook of Holland day and night steamer services. Sketch maps show the road approaches at both ports.

Glacier bearing repair service. An illustrated booklet issued by the Glacier Metal Co. Ltd., of Alperton, Wembley, Middx., describes the bearing repair and maintenance obtainable from the firm's service stations at Alperton, Manchester, and Glasgow. A table gives particulars of Glacier bearing alloys and typical applications. The illustrations include testing and boring machines in use in service stations.

The Railways of Britain: An Historical Introduction. By Jack Simmons. London: Routledge & Kegan Paul Limited, 68-74, Carter Lane, E.C.4. 8¾ in. x 5¾ in. 264 pp. Illustrated. Price 30s. The balance held between the historical and the present and between the several aspects of railway activity gives this informative work a wide appeal. Many of the views expressed are controversial, but they are closely argued. In a review of developments since nationalisation, it is stated that introduction in the Eastern Region of the "Britannia" class 4-6-2 engines "made possible an express service between London, Ipswich, and Norwich of a quality that under earlier managements would have been quite unattainable"; one wonders how former L.N.E.R. men will react to this. As befits the Professor of History at Leicester University, the author is exact in detail and expounds it clearly. The book is dedicated to Mr. John Betjeman "who has done more than anyone living to quicken our response to the Victorian past," and Professor Simmons also has done much to that end. The chapter entitled "Railways on the Ground," with its studies of four sections or groups of lines, is packed with facts and well-expressed views. There are some useful remarks on railway maps. Many of the illustrations are of considerable historical interest.

Middlesex sectional buildings. A brochure issued by J. E. Lesser & Sons Ltd., of Green Lane, Hounslow, Middlesex, describes "Middlesex" sectional timber buildings supplied by the firm. A leaflet, "Progress in Fabrication No. 7," gives particulars of Middlesex PB-3 prefabricated buildings.

Motorcoach Tours on the Continent. Most European countries, from Norway to Greece, and from Portugal to Russia, are included in the programme, illustrated in colour, "Coach Tours Abroad," of Thos. Cook & Son Ltd., and Dean & Dawson Limited. Much use is made of the steamers to the Continent of British Railways and associated undertakings. Greece is reached by steamer from Brindisi to Patras.

Tarmac Group activities. A 62-page illustrated brochure obtainable from Tarmac Limited, Ettingshall, Wolverhampton, or 50, Park Street, London, W.1. features activities and products of the Tarmac Group of Companies. These include aggregate for railway track ballast and other purposes; construction of bridges, railways, and roads; pre-cast concrete; the Aerocem process for preparation and mechanical placement of aerated compounds for grouting and so on; lifting by mobile cranes; site investigation and boring; and Terrazzite floor and wall covering. Among products illustrated are pre-cast, pre-stressed concrete beams post-tensioning at the Stockton Works before despatch to British Railways, North Eastern Region, motive power depot at Hull Dairycoates; and slag ballast from Teesport Works on the East Coast main line.

Holidays in France. Every region of France of interest to the holidaymaker, with opportunities of travel by main-line trains of the S.N.C.F., is included in the 1961 programme of holidays in France of Thos. Cook & Son Ltd. and Dean & Dawson Limited.

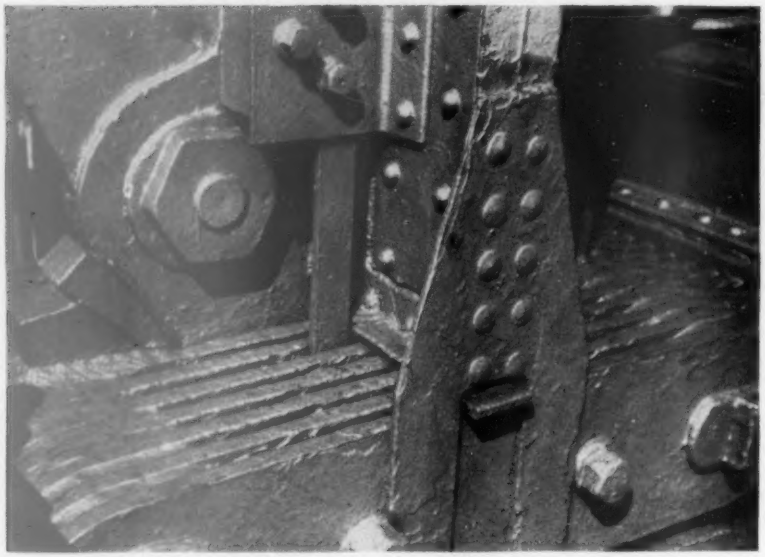
S.I.F. welding techniques. Four leaflets issued by the Suffolk Iron Foundry (1920) Limited, of Sifbronze Works, Stowmarket, Suffolk, illustrate the research and development in welding techniques. That entitled "Super Silicon No. 9" shows how the welding joint can have the full properties of the parent metal. Another leaflet describes Sifbronze fluxes for all metals and varying types of welding, and prevention of oxidation and corrosion. A third is concerned with S.I.F. silver-solder for low-temperature (silver) brazing. S.I.F. stainless steel welding wires are specially prepared for the inert-gas-arc or oxy-acetylene welding processes, and the fourth leaflet gives details of the various specifications.

Holidays in Scandinavia. Rail travel *via* Hook/Harwich and through North Germany and Denmark to Copenhagen; over the Oslo-Bergen and Flåm lines of the Norwegian State Railways; and over the Swedish State Railways is included in the wide variety offered in the 1961 Scandinavian holiday programme of Thos. Cook & Son Ltd. and Dean & Dawson Limited.

Fifty Years of Growing Rubber. Commemorating the jubilee year of Dunlop Malayan Estates Limited, an illustrated booklet describes progress and activities of the Malayan company and of Dunlop Nigerian Plantations Limited. Copies are obtainable from the Dunlop Rubber Co. Ltd., 10-12, King Street, London, S.W.1.

REPAIRS TO ROYAL ALBERT BRIDGE, Saltash, Western Region

Improved centre connections between trusses and track girders to compensate for wear in original connecting pins



Foot of original vertical, showing wedges welded to top of chain intended to locate the ear-plates relative to the chain

BRUNEL'S great bridge carrying the Plymouth-Penzance main line of British Railways, Western Region, over the Tamar River was completed in 1859. It has two 455-ft. main spans and 17 approach spans and is designed for a single line only. Each main span consists essentially of an arched elliptical tubular strut—measuring in section 16 ft. 9 in. wide and 12 ft. 3 in. deep—and a pair of twin suspension chains; the rise of the tube is the same as the sag of the chains. So each is virtually a suspension span, the inward drag of the chains being resisted by the tubular strut. The links of the chains are 7 in. wide, from 1 in. to $\frac{13}{16}$ in. thick, and 20 ft. long.

The accompanying diagram shows the displacement of the chains under the passage of a train which is resisted by a system of 11 verticals of cruciform section, and ten pairs of diagonals. The latter consist of wrought iron ties 7 in. wide and varying in thickness between $1\frac{1}{4}$ in. at the centre and 1 in. at each end of the span. The verticals are riveted to the tube, wedged against the links of the chains, and originally, in effect, extended down to carry continuous track girders supporting the cross girders, a timber deck and the ballasted track.

Wear in pins

Over the course of the 100 years' life of the bridge, considerable wear took place in the pins connecting the diagonals to the bottoms of the verticals, with the result that the so-called truss system ceased to prevent distortion in the curvature of the chains under the passage of live load. This is not very serious where the chains are at a considerable height above the track girders, but at the centres of the spans the matter was different. There, the attachment was to two large ear-shaped plates riveted to the verticals, pinned to the diagonals and extending down between the links of the chains and through the top flanges of the track girders to single pins passing through the webs of those girders. Consequently the horizontal shear became excessive and led to fracturing of the ear-plates and failure of the lower parts of the verticals. Stainless-steel flats bolted to the vertical, threaded through the chains and bolted to the track girders were fitted as a temporary expedient and the position was further safeguarded by the fitting of yokes placed over the chains and under the track girders.

Alterations and improvements

In 1960 permanent repairs were put in hand and, at the same time, the opportunity was taken (1) to alter the attachment between the track girders and the centre nodal point of the "truss" so as to allow some horizontal movement between the two; (2) to improve maintenance facilities by making all parts accessible (3), to tighten all loose diagonal bars, and (4) to renew the bottom 6 ft. of all four centre verticals together with the short lengths of the adjoining diagonals. The work on the four central verticals and the adjoining diagonals was carried out in the space of four Sunday occupations.

With the yokes already in use on the Devon Span, its vertical and adjacent diagonals were first cut, the lower parts being removed. New steel saddles fitted with stub pins to carry new outside suspender links and with bearing blocks resting directly on the links of the upper chains were then placed under the remaining top parts of the verticals.

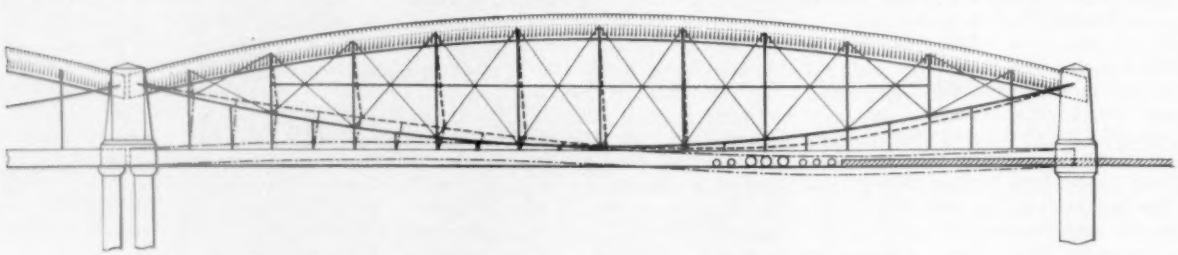


Diagram illustrating by exaggeration the distortions of the trusses under live load

Lower portion of vertical being removed

New steel bottom parts of the cruciform verticals were next bolted to the wrought-iron upper parts with cover-plates and high-strength friction grip bolts. Pre-drilled jacking-brackets were bolted to the new lower parts to enable a 20-ton compressive force—corresponding to the estimated dead-load stress—to be jacked into the verticals before the lower splice joints to the saddle unit were drilled and bolted. Four 50-ton Hydralite jacks were used with screwed rams which maintained the full load by mechanical locking of the rams while the joints were completed. Hydraulic capsules were introduced to check the load from each jack, the small load of 5 tons being too low in the scale of the pressure gauges on the jacks to give the required accuracy. The effect of introducing this pre-stress load at each vertical was to depress the chains and ensure that the live load reaction from the track girders would be shared in the correct proportions by the chains and the tubular strut.

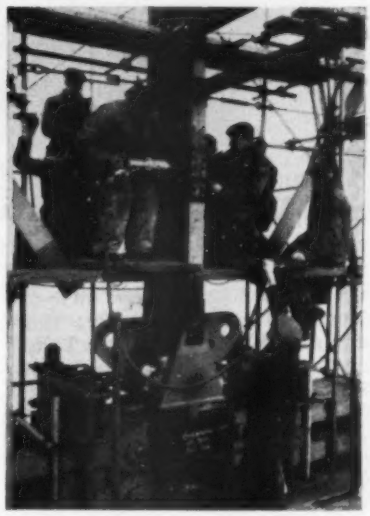
Method of transferring load

The new outside suspender links were next fitted to the top saddle pins; they had the brackets already pinned to their lower ends, ready to be bolted to the track girders. The brackets were clamped and drilled alternately to match the existing $1\frac{1}{8}$-in. dia. holes in the girder web. Bolting with 1-in. high-strength bolts was then completed and the temporary yokes released transferring the whole track-girder load to the new connection.

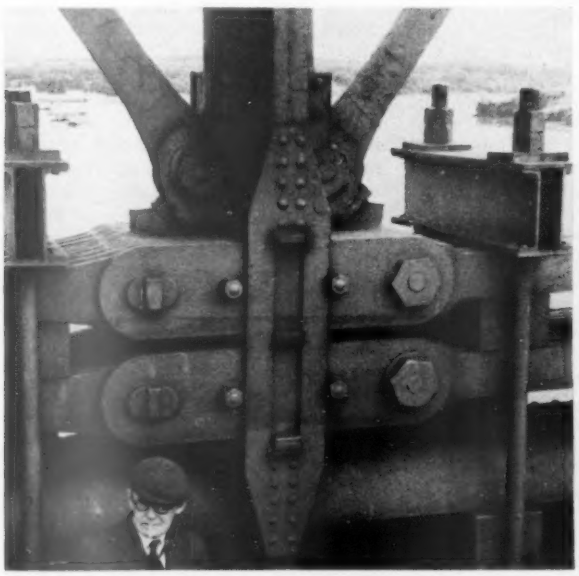
New end connections to the adjoining diagonals were then completed with a tensile dead load of 5 tons induced in the diagonal before the final connection was made. This load was produced with the aid of a cotter, and two bolts tightened against brackets bolted to the twin pin-hole plates forming the new base of each diagonal.

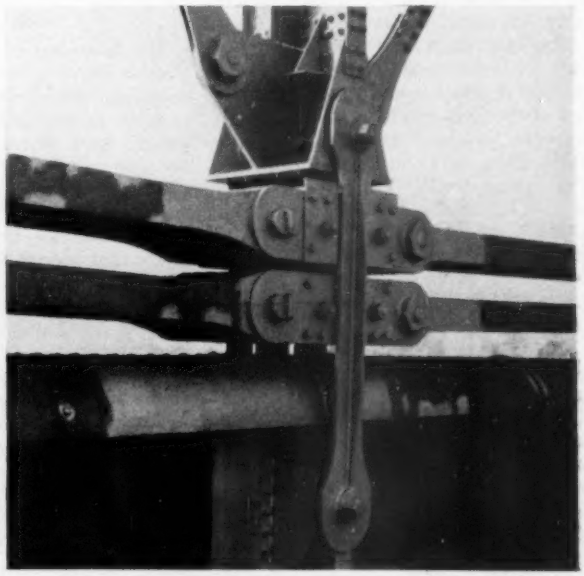
The final operation consisted of fillet-welding the edges of mild-steel plates, resting on the tops of the upper chain

Continued on page 279



New steel section being bolted to remainder of vertical

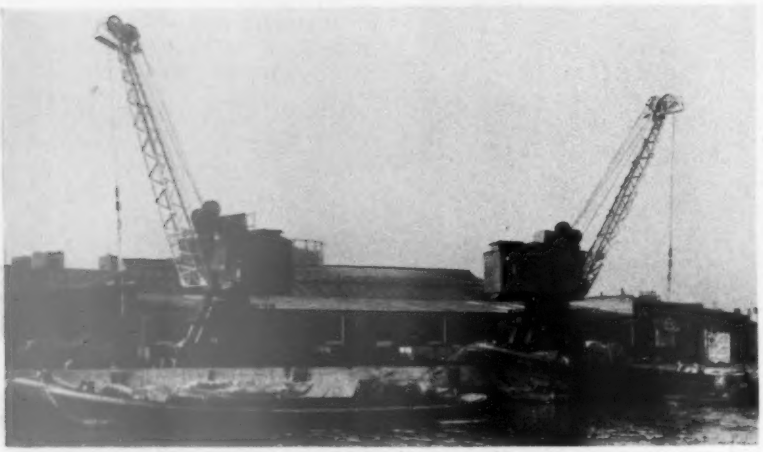




Left : centre nodal point of span, showing diagonals pinned to ear-plates, and right, one of the centre nodal points after remodelling with new saddle and suspender links outside the chains

WATERSIDE ELECTRIC CRANES for Blackwall

Improved facilities designed to attract wide variety of traffic from barge and small ships



View from opposite bank showing two cranes in operation

As part of a scheme to give up-to-the-minute facilities to waterborne goods traffic on the River Thames, the Eastern Region of British Railways has recently carried out the complete modernisation of the wharfeside equipment at Blackwall. Two rail-travelling electric cranes have been installed, replacing three steam-powered machines which had been in service for between 50–70 years.

The improved facilities are expected to attract considerable tonnages of a wide variety of barge traffic, as well as small ships conveying such products as timber, sugar, and potatoes.

The two electrically-operated cranes were manufactured and erected by Stothert & Pitt Limited to the specification of the Chief Mechanical & Electrical Engineer, Eastern Region, and are of the level luffing type, mounted on a 4-ft. 8½-in. gauge track. They have a capacity of 2 tons for general cargo duties within a radius of 40 ft. to 17 ft. 6 in. and a special duty of 6 tons at 17 ft. 6 in. rad. A lift of 54 ft. is available, 38 ft. above rail level and 16 ft. below.

Mounting

The cranes are mounted on four single-flange wheels rigidly fixed to their axles, all wheels being driven. Chassis and gantry are constructed of plate forming enclosed sections, the chassis portion enclosing the ballast. The superstructure is mounted on a live ring of adjustable conical steel rollers and a centre column through which pass the incoming electricity supply cables.

Superstructure base is formed of rolled-steel sections rigidly braced, on which is located the hoist, luffing, and slewing machinery, together with associated control gear. Cladding of the machinery house is wood with large double doors opening at the rear to allow machinery to be lowered to ground level.

The "A" frame is constructed from rolled-steel sections mounted on the machinery base and the pulleys which are fitted to the apex are of cast steel, running in roller bearings. An audible and visual safe-load indicator is fitted.

Hoist unit

The hoist unit consists of a 55-b.h.p. electric motor driving through a flexible coupling, totally-enclosed spur gearing running in oil, to the cast-iron spiral-groove hoist barrel on which is coiled the wire rope. Interlocking prevents the operator from lifting the 6-ton load in any position but the minimum radius of 17 ft. 6 in.

The hoist rope is of 6 x 37 construction, and is fitted with a bobweight and Liverpool hook. Hoist speed is 300 ft. per min. for 2 tons and 100 ft. per min. for 6 tons.

The luffing unit comprises a 10-b.h.p. electric motor driving through the flexible coupling to a totally-enclosed worm reduction unit to the spiral-groove cast-iron wire-rope barrel, which is grooved to take two 6 x 37 construction ropes. Electro-magnetic and mechanically - operated hand brakes are also provided. Luffing speed is 60 ft. per min.

The slewing unit consists of a 10-b.h.p. electrically - operated motor driving through the fluid coupling to a totally-enclosed worm-reduction unit, incorporating a slipping clutch, through to the driving pinion which engages on the slew rack. This forms an integral part of the roller path and comprises bright-steel pins secured by keep-plates. Slewing speed is 2 r.p.m.

Two travel units are fitted to each crane, one unit driving each axle. Each unit comprises a 7½-b.h.p. electric motor driving through spur gearing to the axle. A travelling speed of 60 ft. per min. is obtained. Electro-magnetic and mechanical brakes are provided.

Power supply

Main electricity supply is by six-core trailing cable taken on a spring-loaded cable-reeling drum on the base of each chassis. Switched-socket outlets are provided along the wharf to enable each crane to cover all berths.

Centralised lubrication limits necessity for individual attention to a small number of points such as rollers and pulleys. A Siemens Schuckert earth-proving and monitoring unit is fitted to each crane.

The control gear and crane protective panel is of Allen West manufacture, all motors were provided by Lancashire Dynamo & Crypto Limited, and brakes were supplied by Elliston Evans & Jackson Limited.

The 306-ft. crane track is of special design to meet the operating requirements of the cranes. The centre of gravity of these is high and, because they will work on a standard gauge of 4 ft. 8½ in., the accuracy to which this must be laid and maintained, both in line and level, is critical. Furthermore, the heavy crane-wheel loading calls for a substantial foundation to prevent deflection of the track under working conditions.

With this in view, a reinforced concrete beam foundation has been founded partly on the strengthened and widened river wall and partly on 50-ft. concrete bored piles penetrating a stratum of London clay. To these beams are fixed hardwood longitudinal timbers carrying standard f.b. rails and fittings.

Alterations to wharf sidings to give clearance to the cranes have been carried out, the yard has been resurfaced. The civil engineering work was carried out under the general direction of the Chief Civil Engineer, Eastern Region.

BUFFET CARS
for multiple-unit diesel railcars

British Railways combined passenger and buffet car for bar and light refreshment service

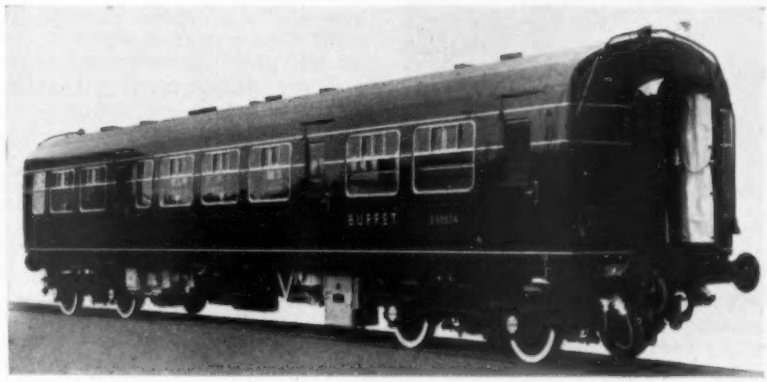
THE delivery of a batch of miniature buffet diesel railcars by the Metropolitan-Cammell Carriage & Wagon Co. Ltd., completes orders to this company from British Railways for a total of 760 railcars.

The buffet vehicles, now in service in the North Eastern Region, are open second-class trailer cars with gangway connections, and will normally operate as units of four-car sets. Seating accommodation is provided for 53 passengers. Vehicle length over buffers is 60 ft. 8 in., height over roof 12 ft. 4½ in., and width over body panels 9 ft. Bogie wheelbase is 8 ft. 6 in. and bogie centres 40 ft.

The car is divided by glazed partitions into three sections, with the buffet compartment adjacent to the vestibule at one end. The main seating portion in the centre of the car accommodates 33 passengers. A central gangway divides the double and triple seat units, the seats facing toward the buffet. Large glazed panels are fitted in the end partitions and sliding doors. The end saloon is a 20-seat non-smoking compartment, with a toilet adjacent to the gangway vestibule.

Buffet accommodation

The buffet compartment, 11 ft. 8 in. long, is arranged to provide the maximum amount of passenger space. A full-length narrow seat is fitted below the windows, and against each end partition is a narrow storage cupboard, finished to provide a table top. Litter bins are attached to the cupboards.



Exterior view of the new passenger and buffet car

A single guard-rail is fitted across the windows. In the centre of the window seat is a grab pole, to which is attached two shelves.

An open-arch entrance is provided at the gangway end and a sliding door at the passenger compartment end.

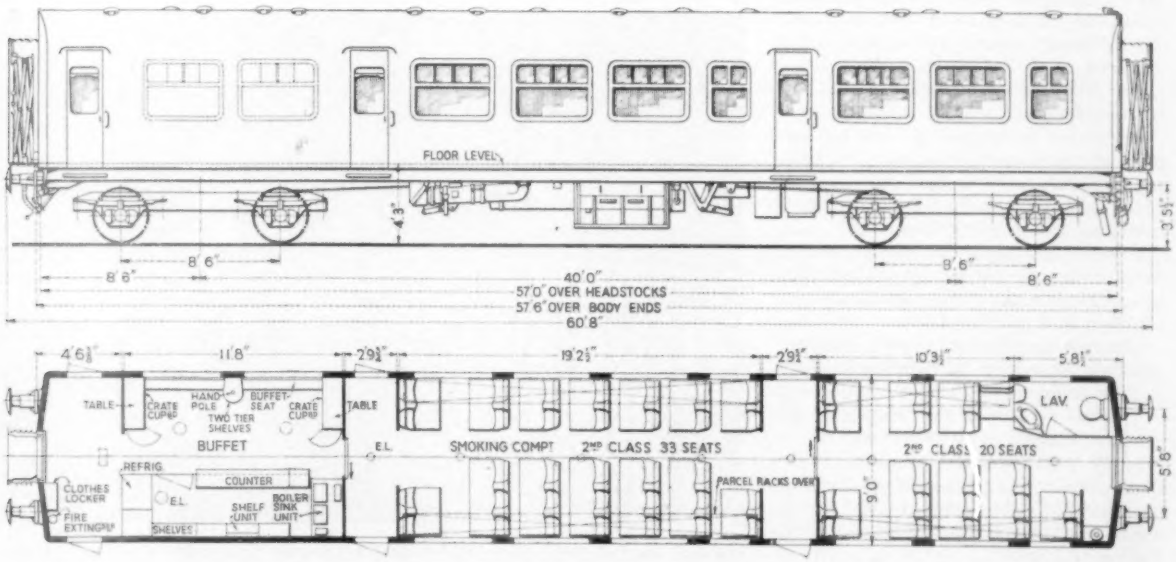
Entrance to the back of the counter is by a flush-fitting hinged door. A 5¼-cu. ft. capacity refrigerator is housed in a recess behind the door, the remainder being used for fitted shelves and cupboards.

The back bar is arranged with shelving for storage and display of wines, spirits, and soft drinks. Storage racks and cupboards are fitted below the counter, at one end of which is a glass showcase.

Across the sealed end of the buffet is a Stott boiler-and-sink unit, the recess for this being lined with stainless steel and Warerite.

Boiler fuel is propane gas carried in four cylinders externally mounted in the underframe. Water is carried in a 75-gal. roof-mounted tank. Aluminium tread-plate is used behind the counter.

With the exception of a broad band of ribbed aluminium at the base, the buffet



Side elevation and plan of the vehicle

Storage cupboards against each partition serve as tables in buffet

front is designed to present a clean flush appearance from floor to ceiling. The serving area is sealed by two shutters, hinged at counter level. These hang vertically in the open position to form the counter front. Inside-locking preserves the clean appearance. The buffet ceiling follows the roof contour of the car. A personal locker for the buffet attendant is installed in the end vestibule.

Buffet décor

Bodyside panels and partition walls throughout the buffet and end vestibule are of Warerite stardust grey 600. The counter top and shelving in the passenger section of buffet are of Warerite stardust blue 718. The counter front, which is formed by the hinged shutters when in the open position, is Formica red, yellow, and green Artwork 5386, and the section of the illuminated shelving immediately behind the bottle optics is in Warerite daffodil yellow. Mouldings are of anodised aluminium. Ceilings are in Laconite.

Bodysides and partition walls of the passenger saloon are lined with Warerite in a special stardust buff pattern and ceilings throughout the saloons are lined with Laconite in off-white colour.

Flooring of passenger saloons, vestibules, and passenger section of the buffet is covered with Nairns linoleum in Cardinal Red marble pattern.

The full-length parcels racks comprise anodised aluminium alloy pedestals with tubular rails.

The 2nd class seats are constructed of tubular frames with chromium-plate top-rails, spring-filled cushions with Dunlopillo back squabs, and Dunlopillo head-rolls. Upholstery is in green moquette trimmed and piped with Zapide p.v.c. cloth.

Lighting is by Stone one-lamp circular ceiling fittings, the exposed metal work of which is finished in Silver Olasto. Bowls are in white flashed opal with silver lines.

Heating is by underframe-mounted Smiths combustion heaters. Warm, filtered air is evenly distributed through ducting at floor level and extracted through roof ventilators. In the summer, the Smiths units circulate cool air.

Body construction

The body is constructed as an integral load-carrying structure in which the frame is made up of steel pressings and the side panels are spot-welded to the structure. Aluminium alloy is used for the centre-section roof members and aluminium for the roof sheets.

Side windows are framed in anodised aluminium and held in flexible rubber mountings. This permits easy removal and replacement and provides a degree of sound insulation. Bodyside windows are wide, and sliding ventilators are incorporated.

The steel passenger entrance doors are fitted with full-drop balanced windows. Inner surfaces of body panels and roof sheets are sprayed with Roberts limpet asbestos.

Bogies and underframes

A riveted assembly of rolled-steel sections and welded sub-assemblies, the bogies incorporate laminated side-springs with rubber auxiliary bearing springs. The swing bolster is mounted on nests of coil springs carried on suspension bolts hung from the main frame. Lateral movement is damped by hydraulic dampers. Shrunk-on tyres are fitted to the 36-in. dia. solid-disc wheels. Manganese steel liners are provided on the Skefko roller-bearing axleboxes and on the axlebox guides.

The brake shoes of the wheels on each bogie are operated by an 18-in. dia. vacuum-cylinder mounted on the underframe. The Gresham & Craven quick-release vacuum system is used, a form of braking which provides a very rapid brake release.

Underframe

The underframe is made up of rolled sections and plate, with headstock and dragbox formed as a completely fabricated unit. Rubber-spring buffers are fitted.

Nife batteries type BN 12H with 300-Ahr. capacity are provided.

Battery-charging is by axle-driven Stone dynamos. These are carried from the bogie headstocks and are driven by Vee belts.

Main sub-contractors were as follow:—

Window equipment	
Main saloon windows	Hallam, Sleigh & Cheston Limited
Entrance door windows	Beckett, Laycock & Watkinson Limited
Plastic panels	Insulation Equipments Limited
Body insulation ...	J. W. Roberts Limited
Seat frames	Accles & Pollock Limited
Seat covering	Moquette (John A. Wood Limited)
Boiler, sink unit ...	James Stott & Co. Engineers Ltd.
Refrigerator, condenser unit thermostat, etc. ...	J. & E. Hall Limited
Parcel racks	James Gibbons Limited
Axleboxes	Skefko Ball Bearing Co. Ltd.
Brake equipment ...	Gresham & Craven Limited.
Lighting fittings ...	J. Stone & Co. (Deptford) Ltd.
Heating equipment ...	Smiths Industrial Instruments Limited

SOUTH AFRICAN AIRWAYS

South African Airways has shown a net profit of over 14 per cent on total revenue earned on Viscount operations for the year ended March 31, 1960, covering more than 3 million revenue-miles flown. The average passenger load factor for the year was 65·23 per cent, with a break-even need of 50 per cent (including freight revenue).

Striped panels in red, yellow, and green form counter front when open, and serving area shutters when closed

Repairs to Royal Albert Bridge

Concluded from page 275

and rammed hard against the bearing block under the saddles, to new side-plates secured by stainless steel set-screws tapped into the outer pairs of links in the chains. This arrangement prevents any movement of the saddle on the links of the upper chains. Brunel's wedges between the upper and lower chains still remain undisturbed, and since the suspender plates at the adjacent nodal points are pinned to both chains there is no likelihood of relative movement taking place between the upper and lower chains under the central verticals.

The new suspender links provide for complete freedom of rotation of the continuous track girders, which can now move freely about their points of support at the centre of each truss span.

Site connections

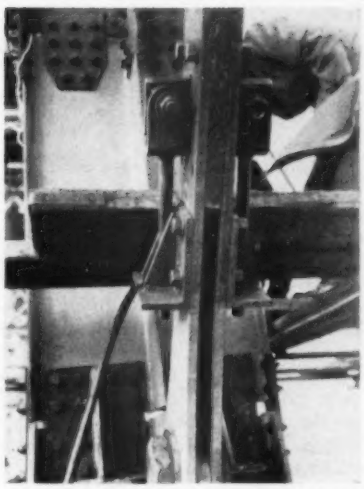
All site connections were made with high-strength bolts. Hand-worked torque-limiting spanners were used for all $\frac{5}{8}$-in. bolts, and pneumatic wrenches, pre-set to the required torque, were efficient and rapid in the tightening of $\frac{3}{4}$-in. bolts and in running up 1-in. bolts.

Some difficulty was experienced in aligning the new with the old work, as the verticals were transversely much out of line with the chains, which also were not always level transversely. Considerable tolerance for adjustment during erection had to be allowed in the design, and the saddle bearing blocks had to be machined to a taper to suit this misalignment.

Re-tensioned diagonals

To eliminate play developed in their joints, 19 diagonals in addition to those at the span-centres had to be re-tensioned. A section was cut from each and the two ends were re-tensioned as described above, the joints being completed with coverplates. The tensioning was effected with an M.H.H. torque-measuring spanner, the torque obtained by calibration against strain gauges.

The work was carried out under the general supervision of Mr. M. G. R. Smith, Chief Civil Engineer, Western Region, the designs being prepared in the Steelwork Office at Paddington.



Rig for tensioning diagonal, with W.I. bar drawn down before bolting to new steel side-plates

Diesel trains in the Netherlands

Modern design for secondary services

FIFTEEN diesel-electric trains, delivered during the last six months to the Netherlands Railways, are replacing the remnant of the 40 well-known semi-streamline triple-car sets built in 1934. Greatly increased electrified mileage has restricted the scope of diesel fixed-formation sets in the Netherlands, and the new trains aim to apply modern equipment for short-distance passenger services on secondary lines.

Whereas prewar diesel train sets throughout Europe had two or more power-transmission groups, these latest triple-car sets have only one engine, of 1,000 b.h.p., placed in a power car at one end of the train; all four axles of this vehicle are driven. The other vehicles are a centre trailer and a control trailer, and the three non-articulated cars extend over a length of 244 ft. An empty train weighs 135 tons, of which the power car accounts for 64 tons. Top service speed is 77 m.p.h. There are 24 first class seats in two compartments and a small open saloon, and 168 second class seats arranged in open saloons. Scharfenberg multi-purpose automatic couplers are fitted.

Car design

Designed and built by Werkspoor N.V. to the requirements of the Netherlands Railways, the trains are of all-welded integral steel-frame construction, but as the power car carries a large engine-generator set, a cooler group and a fuel-tank group all at more or less mid-length, its framing is considerably strengthened compared with those of the two trailers. The roof plate is corrugated, as there are no car lines; the engine-room roof has windows of security glass to increase the lighting.

All passenger side doors are operated electro-pneumatically. Individual opening and closing by passengers is possible, but only if the driver has moved a switch closing the circuit of the doors down the particular side. The guard closes the doors on the start, from any vestibule in the train. The driver cannot close the doors.

Heating and ventilation for each car is self-contained. Heating is by warm air. Fresh ventilating air is drawn in through grilles above the doors down one side of the train, passed through a flap valve and a filter to an air heater in the vestibule roof, and then blown by fan along ducts down the centres of the saloon ceilings. About half is admitted to the saloons through grilles in ceilings; the other half is led down subsidiary ducts to floor level and let out beneath the seats.

Bogies are by Werkspoor, similar to those on all multiple-unit electric trains recently built for the Netherlands Railways, with the exception that the compensating beams between the axleboxes have been omitted; each S.K.F. axlebox now has a cradle below it, on each end of which is a double helical-spring nest. The bolster, as before, has on each side one full elliptic spring and two nests of helical springs. Traction and braking forces between bogie frame and bolster are transmitted through side links with Spherilastik bonded-rubber end bearings, and lateral forces between bogie and bolster are taken by two similar links. Each 37½-in. disc wheel has two double-shoe brake blocks applied by Westinghouse apparatus from four 6¾-in. cylinders on each driving bogie and two 8-in. cylinders on each trailing bogie. A Knorr driver's brake valve is used.

Engine-transmission equipment

Power comes from a Werkspoor pressure-charged and charge-air cooled 16-cylinder V-engine giving 1,000 b.h.p. at 1,400 r.p.m. from cylinders 160 mm. by 200 mm., and with a dry weight of about 10½ lb. per b.h.p. Water cooling, oil cooling and charge-air water cooling are effected in two radiator banks with a roof-mounted fan driven mechanically from the engine, but with a fluid coupling in the drive line to give variable fan speed according to the cooling requirements. The whole cooling group was supplied by Voith.

Flanged direct to the engine is a Heemaf 625-kW main generator, and the control equipment by Heemaf is to a modification of the Westinghouse (U.S.A.) Auto-Load system, with a servo field regulator incorporated in the Woodward engine governor.

LARGE-CAPACITY TANK WAGON

Prototype two-axle vehicle of 40 tons gross for high-speed traffic

A LARGE-CAPACITY prototype rail tank wagon, built by Charles Roberts & Co. Ltd. of Wakefield, will shortly be delivered to the Esso Petroleum Co. Ltd. for service testing under fast traffic conditions.

When used for the transport of fuel oil, the wagon's gross tank capacity for a payload of 29¾ tons is 7,500 gal. The barrel size for this capacity, when mounted on the 15-ft. wheelbase required by the rail curves of many customers' sidings, is up to the maximum permissible loading gauge.

General view of the new rail tank wagon

Integral construction

By the use of an integral construction for barrel and underframe and the extensive use of Hiduminium light-alloy forgings, the tare weight of this 40-ton gross load vehicle has been reduced to 10½ tons. Designed for an axle-load of 20 tons, this exceptionally low tare weight has been achieved with full provision for high-speed operation, incorporating two-stage vacuum brakes, Oleo-Pneumatic buffers, and Timken roller-bearing axleboxes.

The barrel, 8 ft. 6 in. dia. x 22 ft. 6 in. long, has a shell of $\frac{5}{16}$-in. thick Corten steel and $\frac{1}{8}$-in. thick bottom plate and ends, all seams being electrically butt-welded. Welded to the bottom plate are two Tee-section logitudinal members, which are attached to the "Z" section solebars of the underframe. One central baffle plate is fitted below the single manhole.

To facilitate the discharge of heavy oil, steam-heating coils are incorporated. These are made in light alloy and arranged for installation and removal through the central manhole. A substantial walkway of "Q"-type grating is fitted along the tank top, with a tubular ladder for access at one end. Overall height is 12 ft. 5⅛ in. above rail level.

Filling and discharge connections

Filling and discharge is carried out at underframe level from each side of the vehicle. Below the tank, a patented form of slide valve is operated by a hand-wheel adjacent to the hose coupling, and there is an automatic valve-position indicator. The tank is pressure-tested at 25 lb. per sq. in.

Exactor self-sealing couplings, developed specially for the loading and off-loading of road and rail tanker cars, and similar services are fitted. These facilitate coupling and uncoupling at comparatively high pressures, the couplings providing a completely leakproof seal against both pressure in the pipeline, and possible suction conditions up to 12 in. Hg. vacuum.

The coupling can be connected and disconnected easily by one man, the hose half being fitted with a handwheel and the mode of connection being by three-start cam track with rollers.

Method of coupling

Before connection, the check valve in the fixed half-unit is forced against a rubber sealing ring by a spring, and a sleeve valve in the hose half-unit seals against the resilient valve in the valve head. During connection, the rollers first engage in their respective tracks, and further rotation of the handwheel moves the entire hose half-unit forward, so that the outer front face of the sleeve valve engages on the mating rubber joint in the fixed half-unit.

The rubber joint on the valve head then parts from the inner front face of the sleeve valve and, as it enters the fixed half-unit, it depresses the check valve. Disconnection employs exactly the reverse procedure with the result that the check valve seats immediately before disengagement of the sleeve valve from its resilient seat in the fixed half-unit. Consequently, at no time is fluid in direct contact with atmosphere, and spillage during disconnection is reduced to a minimum. At a flow of 500 g.p.m. Kerosene, pressure drop is 6 lb. per sq. in.

The load is transferred to the Timken axleboxes by semi-elliptic laminated springs, anchored to rubber auxiliary springs. The fabricated axlebox guide brackets, with renewable liners, are riveted to the underframe. Bearing journals are 5½ in. in dia. and the solid rolled-steel disc wheels are 3 ft. 1½ in. in dia. with 2¾ in. wide rims.

Braking under full load is by two vacuum cylinders, one of 21 in. dia. and one 15 in. dia. operating through compensated clasp brake rigging. Automatic slack adjusters are incorporated. When running light only one cylinder is used, the changeover valve being operated by the shunter.

Lightweight construction

All brake linkage, shoe holders, and brackets are made in Hiduminium supplied by High Duty Alloys Limited, and the train vacuum pipe is in light alloy. The hydraulic buffers, with 16-in. dia. heads, are of the lightweight type as used on diesel railcars, giving a vehicle length over buffers of 27 ft. 1½ in. The channel-section headstocks are of fabricated steel-plate construction and fitted with Instanter link couplings. Several features used in the design of this vehicle are covered by patents.

GEORGE COHEN 600 GROUP LIMITED

The George Cohen 600 Group Limited, has declared an interim dividend of 4½ per cent actual, less tax, on the £3,125,000 old ordinary stock of the company payable on March 31, 1961 in respect of the financial year ending on that date.

ELECTRIC RAILWAY TRACTION SECTION

Electrification progress in the U.S.S.R.

ELECTRIFICATION of 40,000 km. (25,000 miles) of track is an indication of the scale on which the modernisation of the railways of the U.S.S.R. is being carried out. According to a recent issue of the *Soviet News*, a general plan for electrification was adopted five years ago, which included provision for the above-mentioned mileage to be completed in a period of 15 years. A feature of the plan is that electrification of complete routes has been undertaken, rather than of a number of individual sections of route. Examples of this policy are the Moscow-Irkutsk line, 5,000 km. long, and the Moscow-Donbas route, 1,200 km. long ; important main lines which have already been completely electrified. It is understood that the rate of progress has been such that, during the first five years of the work, a total of 8,483 km. of track had been converted, representing an increase of some 380 km. over that originally planned for this period.

One of the important results of the decision to electrify long, complete routes is that it has enabled long locomotive runs to be operated. This has been accomplished by the introduction of shift working for the crews. It is claimed that no less than 285 additional electric and diesel locomotives would have been required to handle the freight traffic in 1960 if the old methods of locomotive working had been perpetuated.

In addition to the trunk routes already referred to, suburban passenger-carrying lines at many large industrial centres have been electrified, as well as various routes on which heavy freight traffic is operated. The growth of electric and diesel traction during the first five years of the modernisation scheme is clearly demonstrated by the motive power figures given. In 1955, electric and diesel locomotives handled 14.1 per cent of all freight traffic, whereas in 1960, the proportion had risen to 43 per cent. Furthermore, over the period 1956 to 1960, a saving of 125m. tons of coal had been achieved as the result of the introduction of the new types of locomotives, while operating costs in the same period had been reduced by more than 1,700 m. new roubles. Considerable acceleration of the train services has been possible ; for example, on the Moscow-Irkutsk main line, as much as two days have been cut from the freight train timing for the full journey. In the sphere of technical progress, the most important feature is the increasing use of industrial frequency a.c. at 25 kV. A total length of 1,400 km. has already been electrified on this system, which includes heavy-traffic sections on the Krasnoyarsk and East Siberian railways.

Factors which are held to justify the use of the high-voltage a.c. system include a reduction in the amount of construction and assembly work, the attainment of a higher rate of electrification, and the superior traction characteristics of the a.c. locomotive compared with those of the d.c. In support of the latter contention, it is stated that a 12-wheel a.c. locomotive can operate a train of a given weight as well as a 16-wheel d.c. locomotive over a difficult stretch of line. One of the most interesting developments mentioned is the introduction of steel-copper contact wire and steel-aluminium supporting wires.

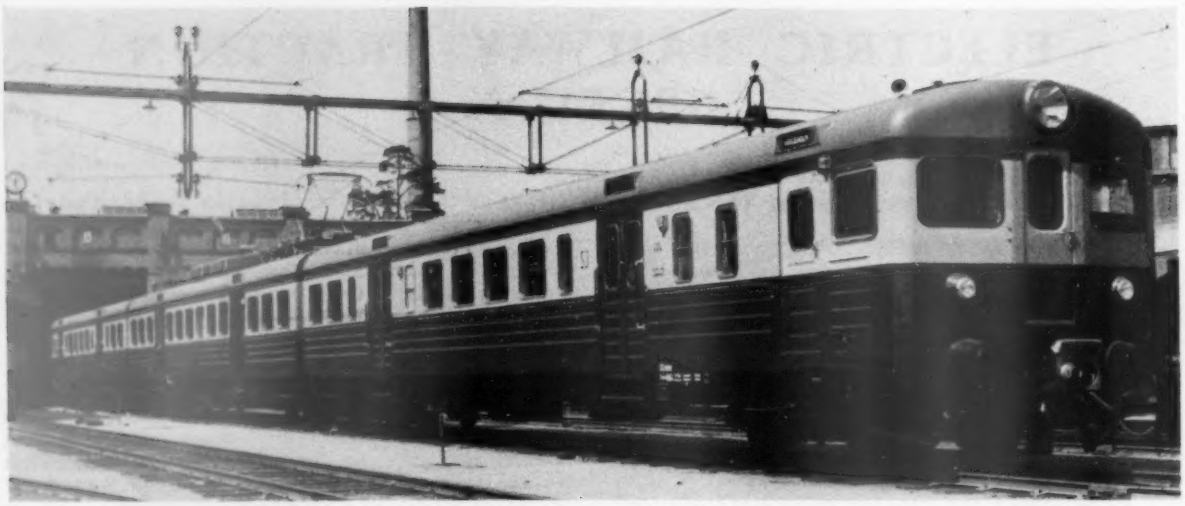
By this means, it is expected that a saving of some 500 tons of copper will be achieved this year, with a consequent reduction in expenditure on the catenary system. It is not stated what type of pantograph contact strip will be used in conjunction with the steel-copper overhead wire, and it would be interesting to hear more details of the arrangement.

From the above brief review some idea may be gained of the immense strides being taken by the U.S.S.R. in bringing its railways up to date, particularly in the realm of electrification. The scale on which electric traction is being extended in this country is dwarfed by the extent of the electrification schemes already achieved and now in progress in the U.S.S.R.

Towards the electronic locomotive

ELECTRONICS may be said to have entered electric traction already with the mercury-arc and semiconductor rectifier. A nearer approach to the electronic locomotive would be one in which electronics figured on a major scale both in the power and the control circuits. A step in this direction is seen in one of three dual-system a.c. locomotives ordered by the German Federal Railway in 1957 for working on standard-frequency and low-frequency lines, the former at 20 kV. as well as 25 kV. This is a Bo-Bo built by Krupp and provided with traction equipment by A.E.G. In addition to having silicon traction rectifiers, the locomotive makes use of transistors for several purposes. The most original of these applications is as a " logic " system taking the place of relay interlocking circuits. The locomotive tap-changing scheme includes transductors for stepless voltage between notches, and the cycle of events is controlled by a series of rotary switching elements driven by a servo-motor. Voltage and current transformers monitor the operation of the tap-changing contactors, an output from their secondaries indicating that the corresponding contactors are closed. Such outputs are fed to the logic circuits in conjunction with others from the rotary switches. The logic elements in turn produce outputs to drive the servo-motor and continue notching providing that each recognises its correct pattern of inputs. This arrangement is based on gating circuits of the kind widely used for other supervisory purposes and in computers. The elements are A.E.G. Logistats comprising printed circuits and transistors in moulded cases.

Several further applications of transistors have been made in the locomotive. They serve as amplifiers for the transductor control currents, detect overcurrents or reverse current in the power rectifier circuits, trigger the short-circuiting device which gives protection against these conditions, and serve as intermediate amplifiers in the circuit for automatic control of rheostatic braking effort. In spite of these refinements, manual control is used for setting up the circuits to run on different electrification systems. The only change of transformer ratio when passing from one voltage to another is made in the supply to the auxiliaries. On the traction side the switching renders certain controller notches inoperative on the higher voltages. The driver can work up to notch 40 on 15 kV., to notch 34 on 20 kV., and to notch 25 on 25 kV., these positions corresponding to 1,000 V. on the motors in every case. On any line voltage four weak-field notches are available after reaching the maximum permissible tapping. A similar system of excluding certain notches on 25 kV. is used in the Swiss Federal Railways dual-voltage a.c. shunting locomotives of Class " 16501," but there the changeover of transformer connections for the auxiliaries takes place automatically by means of track magnets. Where automatic systems are used for either or both purposes, the eventual use of transistors as alternatives to relays may be expected in interlocking and proving circuits. The fundamental requirements of a transistorised relay interlocking scheme are similar to those of a multitude of control systems where the operation of numerous circuits has to be co-ordinated.



ELECTRIC MULTIPLE-UNIT TRAINS on the Swedish State Railways

Three prototype sets recently introduced for suburban traffic

RECENTLY introduced on the Swedish State Railways as prototypes for suburban service were three electric multiple-unit trains. The sets have been put in trial operation on suburban lines around Stockholm.

Each comprises three coaches—one trailer coach on each side of a central powered vehicle. Automatic coupling facilitates rapid joining-up of up to four units. The trains can be operated from the cab at each end of the train irrespective of the number of units coupled together.

Maximum speed is 100 km./hr. which, with the requirements of a stipulated timetable, permits optimum usage of available power output. Layout permits the maximum speed to be increased to 120 km./hr. if justified by a change in conditions.

Accommodation

The number of seats is 310 and there is standing room for about 150 passengers in each unit. Luggage space is provided adjacent to the driver's cab in the trailers. There is also provision for perambulators in the passenger compartments of the trailers, where folding seats replace the more usual fixed type.

To facilitate quick entrance and egress of passengers, the two vestibules are centrally placed and provided with doors, which are remotely-controlled by the train staff or manually operated by passengers. Manual operation is intended for use only during the cold season at terminal stations. For trial purposes, two types of doors have been chosen: folding doors for the motor coach, and sliding doors for the trailers.

As three platform heights (350, 580, and 760 mm.) will be encountered during trials, facilities for entering and alighting from the trains has been adapted to suit the variations. Experience gained from the trial runs will provide data which will be of use when the standardisation of suburban platform heights is under consideration. This matter will be the subject of detailed study and trials, for some of the platforms will also have to be used for suburban trains with ordinary passenger coaches.

Lavatories are provided in trailers only, and, though a passage connects the coaches in each unit, there is as yet no inter-unit passage. Smoking is permitted in the motor coach but not in the trailers.

A thermostatically-regulated air heating system provides each coach with heating and ventilation. Lighting in passenger compartments is by fluorescent tubes and there are incandescent lights for emergency use. Loudspeakers can be operated by the driver to notify passengers of arrival at a stop and to give other information.

Disc brakes

All axles of coaches are fitted with disc brakes, and the motor coach has electric rheostatic braking, the traction motors operating as generators. The primary aim of these devices is to eliminate dirtying of the coaches with the dust caused by brake blocks as well as the work of changing the blocks.

Special care has been taken to obtain robustness of vehicle bodies as well as good sound and thermic insulation. For these reasons the vehicles are not lightweight.

The main supplier is Allmana Svenska Elektriska AB, which company also manufactures the electrical equipment and is responsible for design of the bogies. Output is 1,500 h.p. The motor coaches have been built by Kockums Mek. Verkstads AB, and the trailers by AB Svenska Järnvägsverkstäderna. The cost of a complete set of three vehicles is 1.8 million crowns.

Effect on suburban lines

The three trial sets cannot have any immediate influence on the suburban timetable, which cannot be radically changed until most of the traffic is operated by multiple-unit trains or by stock with equivalent performance. The object of the trials now proceeding is to determine the suitability or otherwise of the multiple-unit trains in various respects and to provide experience on which may be based the definitive arrangement of S.J. suburban lines around Stockholm.

BRITISH THERMOPLASTICS AT MOSCOW TRADE FAIR

B. T. R. Industries Limited and subsidiary companies will exhibit industrial and engineering products in rubber, plastic, and allied materials at the British Trade Fair in Moscow later this year. These will include conveyor belting; industrial hose; Vee-belts; p.v.c. pipes and fittings, and mouldings and extrusions in natural and synthetic rubber and ebonite. The Microcell group will display electronic laboratory equipment; glass-fibre mats and yarns, and glass-fibre processing plant.

SIGNAL POST TELEPHONES in the Scottish Region

Improved communication between trainmen and signalmen on the Glasgow suburban lines

by ROBERT W. McCALL, *Chief Contracts Engineer, Telephone Manufacturing Co. Ltd.*

IMPROVED techniques and the consequent increase in the use of automatic signals have resulted in the closure of many signal boxes. This fact, coupled with the progressive tightening-up of the safety regulations over a period of many years, necessitates speedier means of communication between trainmen and the signalmen controlling the lines over which they run, and it is becoming the practice to provide telephones at many of the running signals. These telephones are known as signal post telephones (S.P.T.).

During the electrification of the Glasgow suburban lines from Queens Street (Low Level) to Helensburgh and Balloch, and from Glasgow Central (High Level) round the Cathcart Circle to Kirkhill and Neilston High, the Scottish Region of British Railways took the opportunity to modernise the signalling system. This includes the installation of S.P.T.'s at all signals not easily accessible from a signalbox, and also at certain ground frames. At the same time provision has been made on the concentrators for the various omnibus circuits from the traffic control rooms at Glasgow North District Control and Glasgow South District Control and also the electrification control at Cathcart Traction Control Centre, thus concentrating all the telephones in any signalbox at one point.

Hyndland-Helensburgh line

On the section of line from Hyndland to Helensburgh this has entailed the installation of concentrator keyboards in 17 signalboxes, 250 S.P.T.'s in weatherproof cabinets at various locations and the necessary power plant. On the south side of the river the installations at Glasgow Central, Newton, and Uddingston include 11 concentrator keyboards, 215 S.P.T.'s, power plant, and so on. This equipment has been designed jointly by the Telephone Manufacturing Co. Ltd., and the staff of the Signal Engineer, British Railways, Scottish Region.

Non-interruption of traffic

One of the most important maxims applied to the operation of a railway is that the traffic must be kept moving at all times, and therefore control equipment must be arranged so that a failure of any part of the equipment will cause as little disorganisation to the whole system as possible. At the same time the equipment must be arranged so that such failures as do occur will be "safe-side" failures. With this in mind and to provide the requisite degree of safety from the operational aspect, certain special features have been incorporated in the circuits.

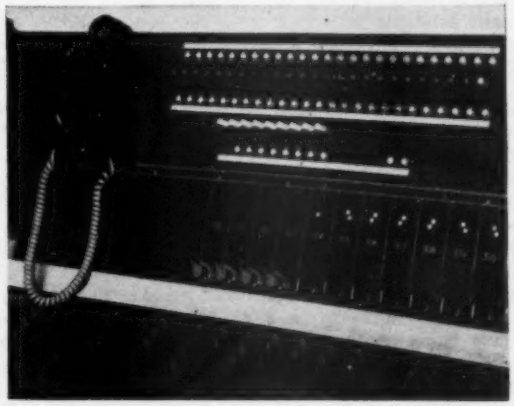
From the safety aspect it must be impossible for a signalman to speak to more than one S.P.T. at a time, for two S.P.T. circuits to interconnect, or for an S.P.T. circuit to become connected with any other type of circuit. To prevent this latter occurrence separate telephohe handsets are installed on the concentrator for S.P.T. circuits and for the omnibus circuits.

To prevent the interconnection of two or more S.P.T. circuits the switching of the lines is carried out by relay contacts, S.P.B.1 and S.P.B.2, and not on the contacts of the selecting keys. This has the further advantage of reducing the wiring involved when the keyboard is separated from the apparatus cubicle (q.v.), thus minimising the risk of cross-talk between circuits. By a chain of contacts in the operating circuit for relay S.P.B., only one such relay can be operated at any one time, and consequently only one S.P.T. line can be connected to the S.P.T. operator's circuit at one time. A series relay S.C.A. in this circuit ensures that the signalman's S.P.T. transmitter circuit can only be energised if this series chain is complete.

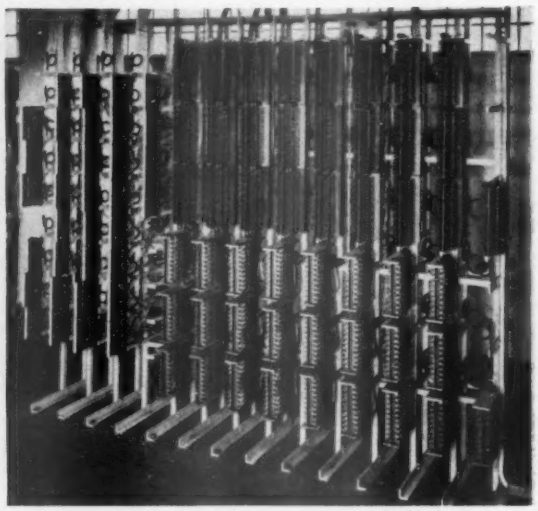
Calling signal posts

Calling out to the S.P.T.'s is by 50 cycles a.c. at 75V, connected to the line by the contacts of the S.P.C. relay when a common S.P.T. ringing key is operated, the selection of the appropriate S.P.C. relay being performed by the S.P.B.4 contact, only one of which can be operated at a time. Associated with the requirements that no two S.P.T. circuits may be interconnected is a stipulation that the cross-talk attenuation between any two circuits must not be less than 80 decibels at 1,000 cycles per sec. This has been achieved by careful arrangement of the components, by reducing the amount of parallel wiring to the minimum, and by magnetic shielding of the S.P.A. relays.

The calling signal from a signal post telephone is caused by the application of a d.c. loop to the line when the handset is lifted, to operate the S.P.A. relay in the



(Left): signalling console; (right): telephone panel for No. 1 signalman



(Left): regulator's and train register desks; (right): telephone distribution frame

concentrator. To guard against the failure of a calling lamp, separate contacts on this relay complete the calling lamp circuit and the pilot relay N.A.A. This relay in turn, by separate contacts, lights a pilot lamp and sounds an audible alarm signal. The calling and pilot lamps are disconnected when the appropriate selecting key is operated to answer the call. As a further safeguard against mis-operation or failure the audible alarm is made to sound under the following conditions:—

(1) If the signalman replaces his S.P.T. handset without restoring the selecting key.
(2) If the signalman restores the selecting key and replaces his S.P.T. handset with the caller still on the line.

The omnibus circuits connected to the equipment are of the polarised code ringing type, in which long and short pulses of d.c. are applied to the line wires in one or other of two senses, to operate polarised relays at the various outstations. Some of the outstations have their polarised relays connected in one sense and some in the other. Consequently the number of stations connected can, in fact, be twice as many as the number of codes available.

Normal or reversed codes

The polarised line relay has flexible leads so that it may be connected at will to accept either normal or reversed ringing codes. The relay, which is similar to the B.P.O. 3000 type, has a permanent magnet core on which is wound a coil of 5,000 ohms d.c. resistance and is adjusted to operate with 5V. applied to the coil in the "operate" direction. The non-operate test figure for the reverse polarity is 70V., this high figure being necessary to guard against false operation arising from inductive surges resulting from codes being sent out in the opposite polarity. In the case of the omnibus lines there is no requirement preventing the interconnection of circuits, and the circuit follows conventional lines in that respect.

Three push type keys are fitted for calling on the omnibus circuits. The first (black) key connects negative battery to the L1 and positive battery to L2; the second (red) key connects the battery in the opposite polarity; and the third (green) key provides for a high-frequency tone, generated by the night alarm buzzer, to be connected to the line for use in certain special cases. This latter facility is not provided on the Glasgow Central equipment.

Power supply

The equipment is designed for operation from a 50-V. d.c. power supply provided in each case by a battery of lead-acid cells float-charged from a constant-potential float charger. It is a specific requirement that, contrary to normal telephone practice, neither pole of the battery shall be connected to earth; this feature is necessary to avoid difficulties which would otherwise arise from the presence of the 25-kV. traction supply. The float charger units are designed so that they may be fed from either 110V. or 230V. single-phase 50 cycles a.c.

For ringing on the S.P.T. lines a 50-cycle 75V. supply is taken from an auxiliary winding of the transformer in the float charger, and this is fed, via a 500-mA. fuse to the S.P.T. relay contacts in the signal post telephone circuits. A ring failure alarm relay, which normally is held operated to this 50-cycle supply, releases if the supply fails and causes a ring fail lamp to glow on the keyboard. For use under these conditions a hand generator is installed on the keyboard, the S.P.T. ringing key having positions for power ringing and hand generator operation.

The ring failure alarm also acts as a mains failure alarm and will indicate to the signalman that the float charger is not operating, and that the equipment is working on the battery only. Because the ring fail (or mains fail) condition may persist for some time, this alarm does not cause the audible signal to sound.

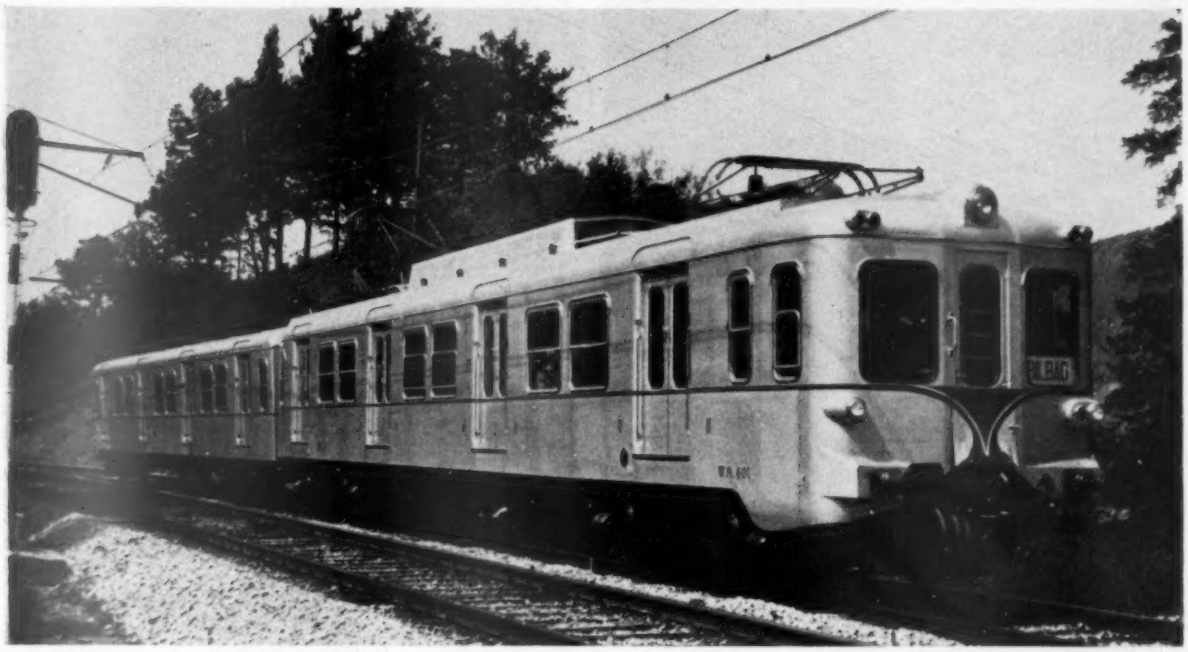
Alarm type fuses are fitted for all circuits on the basis of one fuse to five S.P.T. circuits, and one fuse to four omnibus circuits, with separate fuses for the two "operator's" circuits, the pilot lamp, buzzer, fuse alarm circuit, and so on, in such a manner that the failure of one fuse will not put the complete unit out of action. For instance, the fuse alarm lamp is fused separately from the buzzer.

Equipment at Westerton

The equipment at Westerton signalbox is typical of the equipment installed on the Helensburgh-Hyndland section. The signalbox equipment consists of the concentrator keyboard (24 in. x 14 in. x 12 in.) mounted on top of an apparatus cubicle (2 ft. 1 in. x 3 ft. 5 in. x 12 in.). Each three-position key serves two S.P.T. lines or two omnibus lines, odd numbered circuits being selected when the keys are in the upward position, and even numbered circuits in the downward position. Each line has a calling lamp and an ivorine designation label with the signal number or the omnibus circuit code. The S.P.T. keys are coloured red, the omnibus circuit keys white and all miscellaneous keys yellow.

Two separate plug-in type telephone handsets are provided, one for dealing with S.P.T. calls and the other for omnibus circuit calls. This arrangement has been adopted so that should one of the

Continued on page 286



TWO-CAR ELECTRIC TRAINS for the Spanish National Railways

Electric train sets for operation on the Bilbao-Portugalete line

THE Sociedad Española de Construccion Naval has completed the delivery of a batch of six train units and seven special trailers for operation on the Bilbao-Portugalete line of the Spanish National Railways (R.E.N.F.E.).

Although this is a surface railway, it may, to all intents and purposes, be regarded as a railway of the Underground type, as the distance between the terminal stations (there are 10 stations in all) is no more than 8½ miles, with a mean distance between stations of just less than a mile.

R.E.N.F.E. specified a new type of bogie in keeping with the characteristics of this line on which the vehicles are subjected to frequent acceleration and braking, with consequent shocks between axleboxes and axlebox guides.

Oscillating axleboxes

To overcome these difficulties a bogie was designed with oscillating axleboxes. A plate at one end supports the coil spring, and a rod connects the axleboxes with the bogie frame by Silentblocs.

A pair of these bogies were subjected to preliminary trials and successfully covered some 25,000 miles.

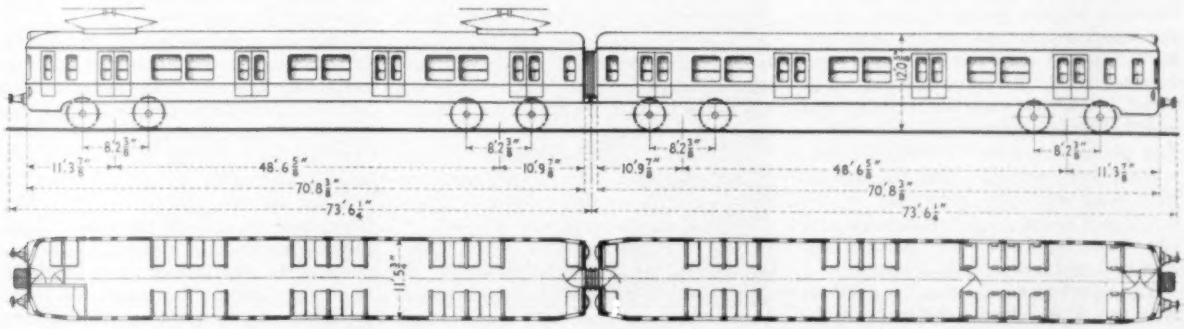
The principal characteristics are tabulated in the next column.

Motor-Car	
Tare weight	61,300 kg.
Maximum load	21,000 kg.
Number of seats	54
Supply voltage	1,500-V. d.c.
Number of motors	4
One-hr. rating	1,000 h.p.
Maximum speed	100 km.p.h.
Standing accommodation	250 passengers
Trailer	
Tare weight	35,250 kg.
Maximum load	21,000 kg.
Number of first class seats ...	20
Number of second class seats ...	36
Standing accommodation ...	250

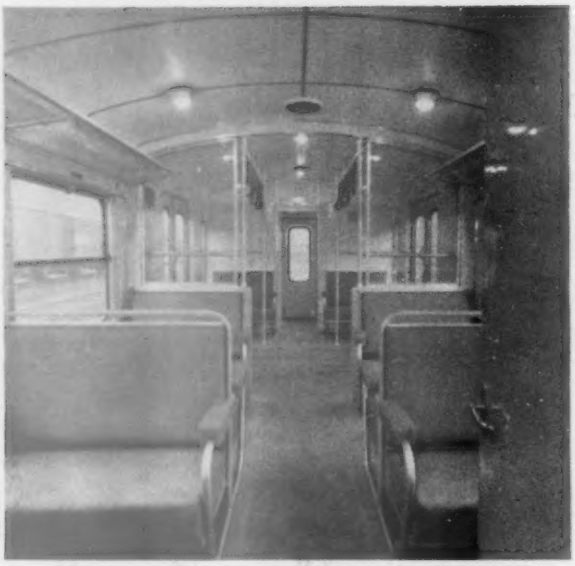
The car body and the underframe jointly form the load-bearing unit which, from a structural point of view, must be regarded as a Vierendeel girder where the top chord is formed by the cantrail with the panelling down to the first waist rail, while the bottom chord is formed by the sole bar, reinforced at the door openings and the coach sheeting.

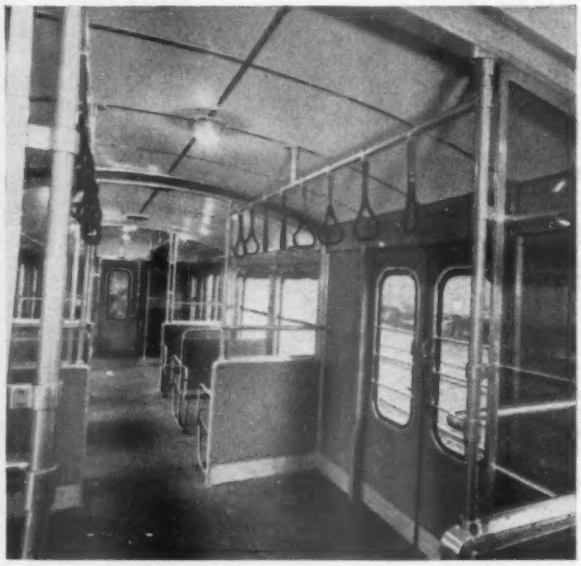
Each coach has eight doors, four on each side, with four spacious vestibules which greatly facilitate the boarding and alighting of passengers and, in addition, provide ample space for standing passengers.

Motor-cars and trailers are fitted with double Westinghouse air brake; a direct



Complete Bilbao—Portugalete unit





(Left): interior of first class trailer; (right): vestibule in second class coach

brake for service braking and an automatic brake for emergency use. The brake rigging of the motor coach is actuated by two 14-in. cylinders, and that of the trailer by one 14-in. cylinder. Both riggings have SAB brake adjusters. Both types of vehicle have a hand-operated stabling brake, while the motor coach is, in addition, fitted with rheostatic braking.

First and second class are distinguished merely by the quality of the seats and the wider spacing between them. All the other fittings are identical. The interior lining of the vehicles consists of painted aluminium sheeting, with a skirting of material of the same type and a hammered finish. Windows are of the two-section Young type.

The seat frames consist of stove-enamelled tubular steel. The first class seats have sprung cushions covered by foam rubber, the whole being covered with plastic fabric. In the second class, the foam rubber rests directly on a wooden base, the whole being covered with plastic fabric.

To protect against draughts without impeding free circulation between vestibules and saloons, windscreen partitions of splinter-proof glass have been installed which give an effect of spaciousness in the cars. All the luggage racks, window frames, light fittings, and so on, are of anodised aluminium alloy.

Magnesite cement floor

Because of the heavy passenger traffic on this line, it was necessary to provide a car floor of the magnesite cement type, with expansion joints and internal ribbing of steel flats to prevent cracking.

The electrical equipment is of the Westinghouse A.B.F. type, manufactured by the Spanish licence holders, Constructora Nacional de Maquinaria Eléctrica S.A. (CENEMESA). The entire motor and control equipment is installed in the motor coaches. Four main motors are directly connected, two of them in series. Each pair of motors can also be connected in series or in parallel. Moreover, each motor has three stages of field excitation. Motors are nose-suspended and act on the wheelset by a pinion and crown wheelset with a gear ratio of 19:61.

The traction circuit comprises two standard R.E.N.F.E. pantographs with corresponding contactors and relays for automatic acceleration and for rheostatic braking. There are also circuit protection devices against lightning surges, overload, no-volt, and over-voltage.

The control and operation of all contactors is of the electro-pneumatic type. The control circuit is fed from a 65-V. battery which is charged by a motor-generator set, parallel-connected, and driven by the 1,500-V. d.c. overhead supply, which is converted into 65 V. d.c.

Signal post telephones in the Scottish Region

(*Concluded from page* 284)

handsets become faulty for any reason the signalman has merely to un-plug it and replace it temporarily by the other handset. At the new signalboxes at Hyndland and Dumbarton the telephone keys have been incorporated in the signalling control consoles on separate prewired panels, and the apparatus cubicles have been mounted separately in the equipment room. A fully-equipped cubicle and keyboard will provide for 30 S.P.T. and six omnibus circuits.

The signal post telephones are tropical-type wall C.B. telephones fitted with retractable handset cords.

The equipment for Glasgow Central (High Level) signalbox is generally similar to that already described, but some additional features are incorporated, and there are some mechanical differences. To enable the regulator or chief lineman to locate one of the linemen working outside, re-entrant type loudspeakers are installed in four groups, each group covering a particular area of the scheme.

To provide for communication between the various signalmen and the regulator and lineman's keyboards, special inter-keyboard circuits are provided.

To give a greater degree of flexibility, essential in a scheme of this size, all circuits are taken through a distribution frame where the lines, relay groups, and circuit keys are inter-connected.

The S.P.T. and omnibus line keys, lamps, and so on for the signalmen are mounted on four hinged panels, one for each of the four signalmen, fitted into the signalling control console.

Only one telephone handset is provided for each panel, a circuit feature being incorporated to connect the handset either to the S.P.T. lines or to the omnibus lines but not to both at once.

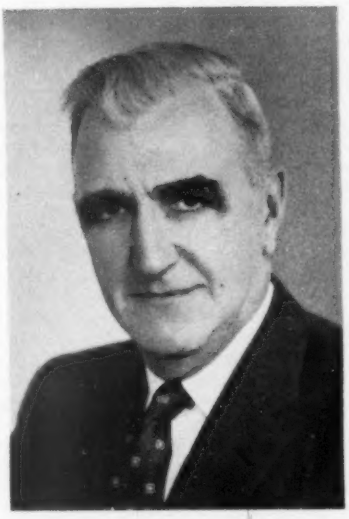
In addition to the four signalmen's panels, keyboards are provided on the dias for the train register boy, the regulator, and for training purposes. These are similar to the keyboards installed north of the river but are mounted directly on the desks and have only one handset each. There is also a keyboard for the lineman.

PERSONAL

Overseas

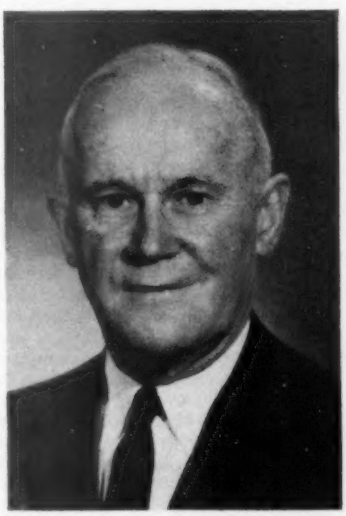
MR. N. R. CRUMP, M.E., LL.D., D.ENG., President of the Canadian Pacific Railway, who, as recorded in our February 24, issue has been elected Chairman & President, has been a Member of the Executive Committee since 1949. Mr. Crump, who was born in British Columbia, joined the railway as a labourer in 1920, at the age of 16. He completed his high school education in Winnipeg and obtained leave of absence from the C.P.R. to study mechanical engineering at Purdue University. Here he obtained his B.Sc. in mechanical engineering in 1929, and, in 1936, his master's degree with a thesis on diesel locomotives, a subject he put to practical use in implementing the C.P.R. dieselisation programme. Mr. Crump subsequently advanced through the C.P.R's motive power and operating departments. He served successively as Apprentice, Machinist, Locomotive Foreman, Master Mechanic, Chief Draughtsman, Assistant Superintendent of the Motive Power & Car Department at Winnipeg, General Superintendent, General Manager, and Vice-President. He has taken an active part in safety campaigns among company employees, directing the construction of the C.P.R's first safety instruction car, a theatre on wheels in which employees and others receive visual education in safety measures. He is the fourth Canadian to hold an honorary membership in the American Society of Mechanical Engineers, an honour conferred on him in 1951. He is a member of the Engineering Institute of Canada, of the Professional Engineers of Quebec, the Dollar Sterling Trade Board, the Railway Clubs of both Toronto and Montreal, the Canadian Chamber of Commerce, the Newcomen Society of England (in Canada), and the American Association of Railway Superintendents.

Mr. N. R. Crump



Mr. J. M. Roberts

MR. J. M. ROBERTS, General Traffic Manager, Canadian Pacific Railway, who has been appointed Vice-President (Traffic), was born in Lancaster and emigrated to Canada, in 1923, joining the C.P.R. as a junior clerk, eventually becoming Chief Clerk in the Traffic Department. He was appointed Assistant General Freight Agent, Vancouver, in 1950, and General Freight Agent, Montreal, in 1952. In 1954, Mr. Roberts became Assistant Freight Traffic Manager for the territory of Quebec and the Maritime Provinces and, in 1956, was the Assistant Freight Traffic Manager for the system. In 1957 he became Assistant to the General Traffic Manager and, in September, 1959, was appointed General Traffic Manager, the position he now relinquishes.



Mr. J. Fullerton

MR. J. FULLERTON, General Freight Traffic Manager, Canadian Pacific Railway, who has been appointed General Traffic Manager, joined the C.P.R's Freight Department at Montreal, in 1918. He later served at Toronto and Hamilton before being appointed Assistant Freight Traffic Manager at Montreal, in 1948. In 1949, Mr. Fullerton took over a similar post at Winnipeg, and was Freight Traffic Manager at Toronto from 1951. In January, 1954, he assumed responsibility as Freight Traffic Manager, Winnipeg, and three months later he became General Freight Traffic Manager. Mr. Fullerton is a director of the National Freight Traffic Association.

MR. N. F. COWIE, Freight Traffic Manager (System), Rates & Divisions, Canadian Pacific Railway, who has been appointed Assistant General Traffic Manager, is a native of Aberdeen, Scotland. He started his career with the C.P.R., in 1926, in Montreal, and transferred to the Freight Traffic Department the following year. He became District Freight Agent, Ottawa, in 1945, Division Freight Agent, Montreal, in 1948, Division Freight Agent, Winnipeg, in 1950, Division Freight Agent Calgary, in 1951, General Freight Agent, Vancouver, in 1954, Assistant Freight Traffic Manager, Winnipeg, in 1955, and Assistant Freight Traffic Manager (System), Rates & Divisions, in 1958. Mr. Cowie was appointed Freight Traffic Manager (Systems), Rates & Divisions, in November, 1960.

Mr. N. F. Cowie

MR. P. KING has been appointed to be in charge of the new office which the Canadian Pacific Railway has opened in Frankfurt.

MR. D. H. C. DU PLESSIS, General Manager, South African Railways & Harbours, is to retire on March 12. MR. J. P. HUGO, Deputy General Manager, is to succeed him.

Mr. D. M. Trotter

MR. D. M. TROTTER, Technical Assistant, Operating Department, Canadian National Railway, who has been appointed Assistant to the Vice-President, Transportation & Maintenance, joined the C.N.R. in 1926 in the Engineering Department at Capreol, Ontario, and became Division Engineer, Hornpayne, in 1945. He transferred to Montreal, in 1946, as Assistant Superintendent, Transportation Department, and two years later returned to Capreol as Superintendent, Operating Department. Later, he held the same position at Stratford. In 1953, Mr. Trotter joined a Statistical Planning Committee at Montreal and has since been Operation Assistant, and Assistant Chief of Transportation.

MR. J. HUDSON, A.M.I.MECH.E., M.I.LOCO.E., Chief Mechanical Engineer, East African Railways & Harbours, who has retired, was apprenticed with the London Midland & Scottish Railway. He later held positions at Stratford-on-Avon, Birmingham, and Bradford. Mr. Hudson joined the Kenya & Uganda Railways as Assistant Locomotive Superintendent in 1937, has been District Locomotive Superintendent, and Superintendent in charge of the workshops at Nairobi. He was also Works Superintendent in charge of Dar-es-Salaam and, in 1953, he became Assistant Chief Mechanical Engineer (Works) in charge of all workshops and port mechanical plant maintenance. He was appointed Chief Mechanical Engineer, in 1955.

Mr. J. Hudson

MR. W. E. BULMAN, B.SC.(ENG.) (LONDON), A.M.I.C.E., A.M.I.MECH.E., Assistant Chief Mechanical Engineer (Technical), East African Railways & Harbours, who has been appointed Acting Chief Mechanical Engineer, was born in Canada on July 6, 1904, came to Great Britain in 1916, and went to King Alfred's School, Wantage. In 1921 he became an articled pupil to the late Mr. C. T Hurry Riches (Locomotive Superintendent, Rhymney Railway), and from 1924-28 he served with the Great Western Railway. He resigned to join William Beardmore & Co. Ltd., and later was on the staff of the Superheater Co. Ltd. In 1930 he was appointed Assistant Locomotive Superintendent, Tanganyika Railways, and, in 1940, he became District Mechanical Engineer, in charge of Dar-es-Salaam workshops. In 1936 Mr. Bulman travelled through South Africa, Rhodesia, the Congo, Angola, Nigeria, and the Gold Coast, to observe railway conditions and working. In October and November, 1946, he visited Canada and the U.S.A. He was appointed Chief Mechanical Engineer, Tanganyika Railways & Ports Services, late in 1946, and on the amalgamation of the East African Railways he was transferred to Nairobi becoming Assistant Chief Mechanical Engineer (Technical) in 1950.

Mr. W. E. Bulman

MR. J. C. EGBUNA, A.M.I.C.E., Assistant General Manager (Works), Nigerian Railway Corporation, who, as recorded in our February 24 issue, has been appointed Deputy General Manager (Supernumary), began his railway career in July, 1942, when he was appointed a Technical Assistant-in-Training. Four years later, he was promoted Junior Technical Assistant and, from 1948 to 1950, was in the United Kingdom on scholarship to study civil engineering. Promoted to Assistant Engineer on his return from Britain in 1950, he has served in various parts of the Nigerian Railway system, notably among his postings being Zaria, Enugu and Minna. Subsequent promotions made him Senior Assistant Engineer, in June, 1952, and District Engineer, in 1957, becoming head of the civil engineering department in the Eastern Railway District. From August 1957 to November 1958, he officiated as the Corporation's Representative in London. In June 1960, he was posted to Lagos to act as Deputy Chief Engineer (Track), and became Assistant General Manager (Works) shortly afterwards.

Mr. J. C. Egbuna

MR. F. H. JAEKEL, M.I.MECH.E., M.INST.T., M.I.LOCO.E., Deputy Chief Superintendent, (Traffic), Nigerian Railway Corporation who, as recorded in our February 24 issue, has been appointed Chief Superin-

Mr. F. H. Jaekel

tendent, was born in April, 1913, and was educated privately, and at St. Albans School. He served his time as an Engineering Apprentice with the L.M.S. Railway at Derby during the term of office of Sir Ernest Lemon as Chief Mechanical Engineer and during this time he studied at Derby Technical College. After a period with the Central Materials Inspection Bureau, he was appointed Improver and sent for training in the Motive Power Superintendent's Department, at Rugby, Crewe, and Euston. Later he was selected for training in the Chief Operating Manager's Department and spent a year with the District Control Office at Chaddesden and the Divisional Operating Superintendent's Office at Derby. Following short spells as Assistant Engineer (Overseas) with the Asiatic Petroleum Company and as Locomotive Draughtsman with Coras Iompair Eireann, he was appointed Draughtsman & Instructor to the Nigerian Railway, in June, 1938. After acting as Chief Draughtsman he was promoted Assistant District Running Superintendent, in January, 1946, and posted to Zaria. After a period in charge of Enugu workshops he was promoted Senior Assistant Locomotive Superintendent, in June, 1947. He acted as District Locomotive Superintendent on three occasions before being promoted to that rank, in April, 1949. On promotion, in 1952, as District Superintendent, Zaria, Mr. Jaekel took charge on the Northern District of the duties previously allotted to the District Traffic and District Locomotive Superintendents which had become merged under the new organisation on the Nigerian Railway. In June, 1954, he was promoted Assistant Chief Superintendent (Power) and on the formation of the Nigerian Railway Corporation on October 1, 1955, he accepted employment with the Corporation as Deputy Chief Superintendent (Power). In 1958 he was appointed Deputy Chief Superintendent (Traffic) and after acting as Chief Superintendent on three occasions received his present appointment in November, 1960.

MR. J. E. S. HARRISON, Indoor Assistant, Stores Department, Rhodesia Railways, has retired.

Industrial

MR. F. J. NEWMAN, Pritchett & Gold and E.P.S. Co. Ltd., has retired.

MR. R. H. PHILLIPS has been made a director of Pirelli-General Cable Works Limited.

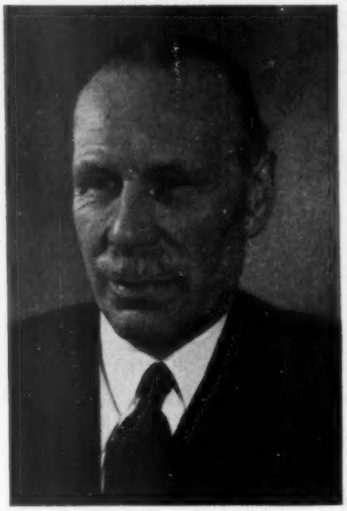
SIR LESLIE GAMAGE, who has recently retired from the Chair of the General Electric Co. Ltd., will continue to act as Chairman of Pirelli-General Cable Works Limited.

MR. D. HODGE, Chief Designer, Diesel Engine Division, English Electric Co. Ltd., Rugby, has been appointed Chief Engineer, Diesel Engine Division, Preston.

MR. A. B. BOATH has been appointed Manager (Railways), J. W. Roberts Limited, a member of the Turner & Newall Limited Organisation. Mr. Boath was a former Assistant District Motive Power Superintendent with the British Transport Commission and later a member of the Railway Division of the British Timken Division of Timken Roller Bearing Company.

British Railways

MR. A. E. C. DENT, Road Motor Engineer, British Railways, London Midland Region, who has retired, began his railway career as a premium apprentice in the locomotive works at Swindon, on the former Great Western



Mr. A. E. C. Dent

Railway in 1911. He served with the Royal Field Artillery from 1914-1919 and, on demobilisation with the rank of Captain, returned to Swindon to complete his apprenticeship. In 1923 Mr. Dent transferred to the Road Transport Department at Slough and, two years later, was appointed Assistant Supervisor of Cartage & Omnibus Services at Neath. He became Supervisor of Omnibus Services at Wrexham in 1927 where he remained until 1929, when he returned to Slough as Assistant to the Motor Assistant. Nine years later he was Motor Assistant to the Superintendent of Road Transport at Paddington and, in 1942, was appointed Road Motor Engineer of the former G.W.R. Mr. Dent became Executive Officer (Road Motor Engineering) Railway Executive, in 1948, where he remained until 1954 when he was appointed Road Motor Engineer, Eastern & North Eastern Regions. He became Road Motor Engineer, London Midland Region in 1955. Between 1944 and 1948, Mr. Dent was a Director of the Western National Omnibus Co. Ltd., City of Oxford Motor Services Limited, and E. G. Oldham Limited (Cattle Hauliers). He served as a Member of Council of the Public Transport Association and the I.A.E. Research Committee and was also one of the British Transport Commission representatives on the Council of the Motor Industry Research Association. For several years he was Chairman of the Executive Committee of that Association. He was Chairman of the Road Motor Engineering Committee, British Railways, and acted as liaison between the British Transport Commission and the Road Motor Engineering Services of the Regions.

MR. A. GREENHILL, Senior Assistant, Organisation & Methods, British Transport Commission, has been appointed Organisation & Methods Assistant, Chief Establishment & Staff Office, Liverpool Street, British Railways, Eastern Region.

MR. A. W. BEST, Assistant Works Accountant, Darlington, North Eastern Region, British Railways, has been appointed Assistant to Accountant (Rolling Stock & Paybills), Darlington.

Ministry of Transport

The Minister of Transport has appointed MR. B. C. L. BARTON to be a member of the Transport Users' Consultative Committee for the East Midland Area, until May 31, 1962, as a representative for industry in place of MR. J. H. CRIDDLE, who has resigned. Mr. Barton is Transport Manager, John Player & Sons, Nottingham.

Obituary

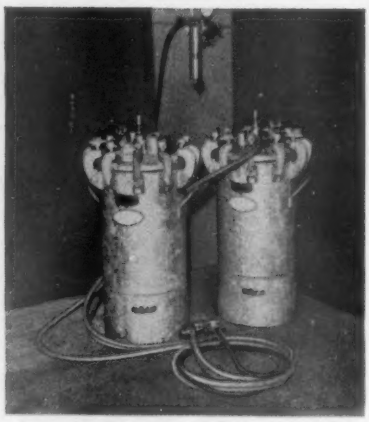
We regret to record the death, on February 25, of MR. EDWIN LEES, M.B.E., District Passenger Manager, Glasgow, British Railways, Scottish Region. Mr. Lees joined the service of the Lancashire & Yorkshire Railway in 1914, and during the 1914-18 war served in the King's Own Royal Lancashire Regiment. He returned to the railway service and occupied various posts in the Commercial and Operating Departments. From 1931-41 he held appointments as Assistant District Controller at Rugby, Patricroft, Liverpool, Birmingham, and Willesden

The late Mr. E. Lees

before taking up the position of District Controller, Lancaster, and, in 1946, District Controller, Wigan. The same year he was promoted to be Assistant District Operating Superintendent, Liverpool Lime-Street, and, in 1949, went to Carlisle as District Traffic Superintendent. He was appointed District Traffic Superintendent, Ayr, in 1952, and District Passenger Manager, Glasgow, in 1956. Mr. Lees was awarded the M.B.E. in 1956.

We regret to record the death, on March 1, of MR. B. CHESTON, Joint Managing Director, Hallam, Sleigh & Cheston Limited.

NEW EQUIPMENT *and Processes*



RIGID POLYURETHANE FOAM
by spraying

A new spraying technique developed jointly by the Aerograph-DeVilbiss Co. Ltd. and the Baxenden Co Ltd. eliminates machine and batch mixing, with the attendant shuttering or battening to retain the foam in position.

Applications recently demonstrated included the quick-fire spray insulation of a large section of steel plate (illustrated), a roof interior, a complex but typical arrangement of service pipes, and the internal lining of a packing case.

Further details can be obtained from the Aerograph-DeVilbiss Co. Ltd., 47, Holborn Viaduct, London, E.C.1.

FILTER UNITS

A range of single- and double-chamber filter units is designed to remove solids in suspension from liquids such as oils, and water solutions.

The single-chamber unit will be known as the Uniplex filter; the double-chamber unit as the Biplex filter.

A wide range of service conditions are provided for by the standard design of the units and by the standard specification for component materials. This reduces the number of instances when it is necessary to employ filter units of a special design, or components manufactured from special materials. Maintenance is easy.

The illustrations alongside show (left) a single-chamber Uniplex filter cut away to show the arrangement of the inlet and outlet ports, the location of the filter basket, and other components, and (right) a double-chamber Biplex filter unit, cut away to show the arrangement of the centrally-located control valve by means of which the flow of liquid is directed to either or both chambers.

The Uniplex filter illustrated is in the size range ½ in. to 1½ in. The filter basket in the larger sizes is not mounted on a central spindle, and the cover plates are secured in position by four wing nuts—see right illustration.

In the Uniplex filter the liquid enters through the inlet port (left) and flows upward to the head of the chamber, downward into the filter basket, and out through the metal-gauze-lined walls which arrest the passage of the particles of foreign matter. On the right is the outlet port.

In the Biplex unit, the valve is open to the right chamber toward which the control lever is pointing, and the left chamber is closed off. In this position the left chamber can be opened up and the filter basket removed for cleaning. The filter basket is shown partially raised illustrating the ease with which it can be removed for cleaning.

The design of this Biplex filter relates to the size range 2 in. to 6 in. The filter basket in the smaller sizes is mounted on a central spindle with a single cover locking screw—see lower left illustration.

The Biplex filters are designed for continuous operation. A centrally-located and manually-operated control valve permits flow to be switched from one chamber to the other. There is no interruption of flow when it is necessary to remove a filter basket for cleaning. The valve of the Biplex filter is so designed that it is impossible simultaneously to shut off the flow from both chambers.

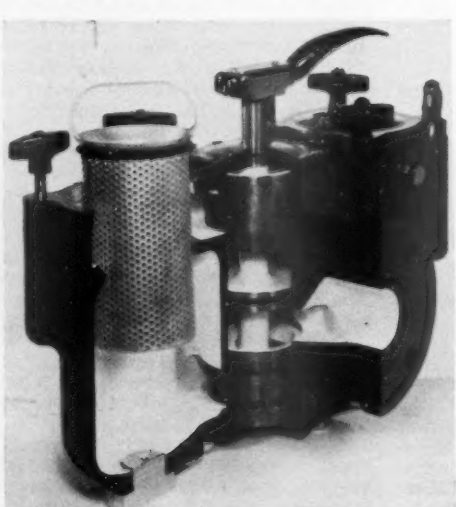
Both filters are designed to operate at temperatures up to 120 deg. C. (248 deg. F.) and at pressures up to 150 lb. per sq. in. Performance data relating to tests carried out under various operating conditions is undertaken.

Further details can be obtained from the Filter Division, Zwicky Limited., Buckingham Avenue, Slough, Bucks.

TACHOMETER TESTER

A dual tachometer tester meets modern date calibration requirements of engine-speed tachometers and generators. It uses a transistorised tuning fork which provides a stable frequency, thereby ensuring accurate stroboscopic image during tests.

Further details can be obtained from Bryans Aeroquipment Limited, 1 & 15, Willow Lane, Mitcham, Surrey.



The English Electric Group

The annual general meeting of the English Electric Co. Ltd. will be held on March 23 in London. In the course of his statement circulated to stockholders, the Chairman, Lord Nelson of Stafford, said:—

Output for 1960 was practically identical with that for 1959. Orders booked in 1960 were substantially higher than ever before and as a result there are good prospects for increased output in 1961. The parent company and certain of its subsidiaries showed substantially better results in 1960 than in the previous year.

However, after allowing for adverse factors there is a group profit after tax applicable to members of the company of £3,142,580 compared with £3,125,870 last year.

Investment for the future

The immense developments in the electrical industry since the war have necessitated great research and development effort, larger workshops and machine tools, testing equipment of greater capacity and a considerable investment in education and training. You can therefore be confident that we have equipped ourselves to meet any future demands made upon us.

Rationalisation by merging of interests, research agreements and other methods is constantly under review to avoid wasteful duplication in the use of scientific and technical personnel and to ensure maximum loading of production facilities.

Unfortunately, the word rationalisation is sometimes misunderstood. It should not raise fears in the minds of those who work in industry because of changes which may take place in their employment, for the aim of such moves is to bring more work to this country and to ensure greater stability of employment.

Competition in export markets

Your company has always played a leading part in export business, and something approaching a third of our great output goes abroad.

We must emphasise that 50 per cent of our costs are for raw materials and manufactured accessories, and we believe that those firms who supply us with them must also concentrate on cost reduction and share with us the responsibility of obtaining some of the overseas business now being lost to foreign competitors.

The Government's medium term export credit insurance period is often not long enough for capital goods and too expensive as compared with facilities offered by other countries. We, therefore, welcome the Government's assurance of encouragement to export business by improved credit facilities.

Manufacture overseas

Political and economic changes occurring in all parts of the world are affecting British business in two principal ways. In the first place, many countries had been industrialised in the past by British finance and enterprise and many of their undertakings were staffed by British engineers, who naturally had a tendency to accept automatically British standards and British equipment. In modern conditions these ties have been greatly loosened and what were previously regarded primarily as British markets are now scenes of intense international competition.

In the second place, many countries wish to move from an economy based mainly on primary industries to one including an increasing element of manufacture. I, personally, welcome these changes because I believe that they offer us even greater opportunities for export of capital goods in the future.

For this and other reasons your company has played its part in developing overseas manufacture having established factories in Canada, Australia, South Africa and India. These activities also enable us to maintain a selling organisation ready to meet these countries' needs and able to deal with special projects involving the importation of British equipment.

Lord Nelson of Stafford then reviewed the achievements of the principal companies of the group: the English Electric Co. Ltd.; Marconi's Wireless Telegraph Co. Ltd.; Marconi International Marine Communication Co. Ltd.; D. Napier & Son Ltd.; English Electric Valve Co.; the Vulcan Foundry Ltd. and Robert Stephenson & Hawthorns Ltd.

Vulcan Foundry Limited

Group results show further improvement

The 98th Annual General Meeting will be held on March 23 in London. The following is an extract from the review by the Chairman, the Rt. Hon. Lord Nelson of Stafford, LL.D., F.C.S.I., D.I.C., M.I.Mech.E., M.I.E.E.

Directors

In May last, Mr. H. J. H. Nethersole was appointed a Director. Formerly Managing Director of the English Electric Company of South Africa, Mr. Nethersole was appointed General Manager, Traction, of the English Electric Co. Ltd. at the beginning of 1960, and his appointment to the Vulcan and Stephenson boards strengthens the co-ordination between the traction elements within the English Electric Group.

Financial results

I am pleased to say that the Group trading results show a further improvement. The profit on trading account is £574,209, after charging depreciation of £148,661, compared with a profit of £435,784 in the previous year. After tax and making subvention payments of £475,000 within the English Electric Group, there is a net profit of £53,709.

The year's work

The major part of our production was again for the home railways, including four classes of diesel-electric locomotive ranging from the 1,000 h.p. Type "1" to the 3,300 h.p. Type "5" (powered by Napier "Deltic" engines), and also a.c. electric locomotives for the newly-electrified lines on the London Midland Region. English Electric locomotives built at the Vulcan Foundry were among those used to inaugurate the electric service between Crewe and Manchester; their performance has been generally satisfactory and one of these locomotives was exhibited by the British Transport Commission in London during its extremely successful Electrification Conference in October, 1960.

In September last, we delivered the 100th Type "4" locomotive built by English Electric for British Railways, and these locomotives have been giving excellent service on express passenger trains.

In addition to our home orders, we built for overseas markets about 30 diesel-electric locomotives, mainly for the railways of East Africa, Ghana, and the Sudan.

Robert Stephenson & Hawthorns Limited

Further extensions have been made to the workshops at Darlington, both for main-line locomotive production and to cope with the work taken over from Newcastle, including the manufacture of steam locomotive spares, for which there continues to be a small but steady demand.

Future Prospects

The orders we now have on our books should ensure another satisfactory year in 1961, but the longer-term prospects are by no means clear. The industry has suffered from the modernisation "standstill" imposed some months ago by the Minister of Transport, pending investigation by his Department of the exact position, and the placing of further locomotive orders has not yet been finalised, consequently the Commission has not been able to provide a programme of probable locomotive requirements, which seriously handicaps manufacturers in their planning ahead for production.

In addition, growing pressure has been exerted in certain channels towards the allocation of more locomotive orders to the railways' own workshops, and less to private industry. The locomotive manufacturers' case for a steady flow of orders from the home railways is a very strong one, based on strengthening its ability to secure export orders. This is difficult enough even when manufacturers have a steady flow of home orders on which they can depend, but whereas this applies to our overseas competitors, Britain is the only country of any importance in which the railways build their own locomotives. The weakening of the background of home orders for British manufacturers puts them at an immediate disadvantage in relation to their foreign competitors. I appreciate that there are delicate and complex factors involved in this question, but it is of the most vital importance that the locomotive industry should be assured of a regular flow of orders from British Railways,

at this time when there is so much emphasis on the necessity for increasing the country's export trade.

I sincerely hope that the current difficulties in connection with British Railways orders are only transitory, and that we shall receive further substantial business from the railways, with whom we have had such a pleasant and mutually beneficial relationship throughout the course of the Modernisation Programme.

There is little change in the export position, except that foreign competition has been further intensified. We are of course only too anxious to export our products—it is as vital to the future of our organisation as it is to that of the country as a whole that we should carry on the tradition of building locomotives for overseas railways which was started by Vulcan and Stephensons well over 100 years ago.

Some factors are largely outside our control, particularly the facilities for financing contracts over a long period. There is no doubt that we are at a disadvantage in this respect in comparison with our American, European, and Japanese competitors, and this is a matter which we are constantly representing to the Government at the highest levels.

Other products

The production of the English Electric diesel engines, for industrial and marine applications as well as for traction purposes, is now well established at Vulcan, and made a useful contribution towards the trading results in 1960.

The demand for the Clayton steam boiler, manufactured under licence from the Clayton Company of U.S.A., is building up well from a variety of customers. In addition to the increasing number of these boilers now in use on British Railways' diesel locomotives for train heating, more than 70 have been delivered to a Hungarian manufacturer for installation in railcars for the Polish State Railways.

NEW DAGENITE DEPOT

Pritchett & Gold & E.P.S. Co. Ltd., has transferred its Newcastle depot to 20, Bankwell Lane, off High Level Bridge Approach, Gateshead-on-Tyne 8. Tel. Gateshead 70034.

North Eastern train service alterations

British Railways, North Eastern Region, has announced the following train alterations from March 6 :—

York and Doncaster

The 11.25 a.m. (Doncaster to York) has ceased to call at Temple Hirst and will leave Selby at 11.49 a.m. and arrive York at 12.06 p.m. The 8.27 a.m. (York to Doncaster) has ceased to call at Temple Hirst, will arrive Doncaster at 9.08 a.m.

Leeds Central, Castleford Central, and Pontefract

The 10.30 p.m. (Leeds Central to Pontefract Baghill—Saturdays only—and Knottingley — Saturdays excepted) has ceased to call at Stanley and calls at Ardsley each weekday instead of on Saturdays only.

Leeds Central, Bradford Exchange, and Halifax Town

The 8.12 a.m. (Low Moor to Leeds Central) will depart Low Moor at 8.10 a.m., Stanningley 8.20 a.m., and arrive Leeds Central at 8.33 a.m.

Halifax Town to Stockport Edgeley

The 8.30 a.m.—Saturdays only—(Halifax Town to Stockport Edgeley) has been withdrawn.

Leeds City and Ilkley

The 8.15 p.m. diesel (Leeds City to Ilkley and intermediate stations) has ceased to call at Armley, Kirkstall, and Calverley and will depart Guiseley at 8.32 p.m., Menston 8.35 p.m., Burley-in-Wharfedale 8.38 p.m., Ben Rhydding 8.42 p.m., and arrive Ilkley at 8.45 p.m. The 10 a.m. diesel (Ilkley to Leeds City) has ceased to call at Calverley and Kirkstall and will arrive Leeds City at 10.28 a.m.

Wakefield (Kirkgate) and Sowerby Bridge

The 5.19 p.m. (Wakefield Kirkgate to Sowerby Bridge) will leave Wakefield Kirkgate at 5.21 p.m. and Horbury Millfield Road at 5.27 p.m. On Saturdays, this train will depart Horbury & Ossett at 5.30 p.m., Mirfield 5.45 p.m., Brighouse 5.54 p.m., Elland 6 p.m., Greetland 6.03 p.m., and arrive Sowerby Bridge at 6.08 p.m.

Leeds City and Huddersfield

The 9.15 p.m. (Huddersfield to Leeds City) will leave Huddersfield at 9.11 p.m. and run 4 min. earlier throughout, arriving at Leeds City at 9.45 p.m. and provide a connection with the 9.50 p.m. diesel from Leeds to York.

The 6.15 p.m.—Sundays only—diesel (Huddersfield to Leeds City), serving intermediate stations, will leave Huddersfield at 6.10 p.m. and run 5 min. earlier throughout, arriving Leeds City at 6.44 p.m.

Leeds City and Newcastle

The 5.09 p.m. (Leeds City to Newcastle) will depart Leeds City at 5.13 p.m., Harrogate 5.55 p.m., Ripon 6.13 p.m., Northallerton 6.33 p.m., Darlington 6.56 p.m., Durham 7.21 p.m. and arrive Newcastle at 7.40 p.m.

Leeds City, Hull, and Hornsea

The 5.13 p.m. diesel (Leeds City to Hull and intermediate stations) will depart Leeds City at 5.07 p.m. and run 6 min. earlier throughout arriving Hull at 6.35 p.m.

The 6.50 p.m. (Hull to Hornsea and intermediate stations) will leave Hull at 6.40 p.m., and run 10 min. earlier throughout, arriving Hornsea at 7.18 p.m.

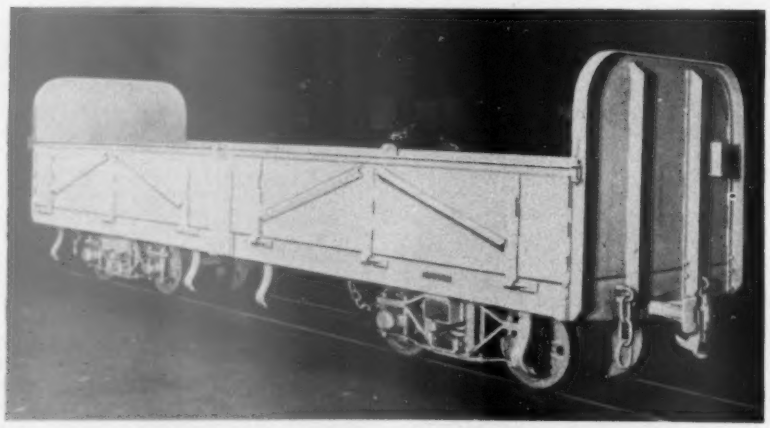
Leeds Central, Wakefield, Westgate, and Doncaster

On Sundays, an additional train leaves Doncaster at 9.25 p.m. for Leeds Central, calling at Wakefield Westgate at 9.56 p.m., and arriving Leeds Central at 10.18 p.m.

Rolling stock for the Sudan

The nine ton capacity double bogie open-sided steel goods wagon, illustrated on this page, is part of a £300,000 contract awarded by the Sudan Gezira Board to Robert Hudson Limited. The equipment is required for the Sudan Managil extension scheme and will include 580 wagons of the type illustrated, and 120 wagons of the same capacity but of all steel closed construction provided with one sliding door on each side.

The balance of the order is made up of 15 double bogie 2,000 gal. oil tank wagons, 6 double bogie 2,000 gal. water tank wagons, and 3 double bogie nine ton box wagons. The latter vehicles will be of aluminium alloy and mounted on steeel underframes and bogies.



Double bogie steel goods wagon for the Sudan Gezira Board

Construction of station buildings resumed

Work on constructing the Central Line stations at Northolt, South Ruislip, Ruislip Gardens, and West Ruislip, which began before the war, and was subsequently halted, has again been put in hand. These stations, including the station buildings, have served in an incomplete state for years, but the placing of contracts by the Western Region of British Railways will result in the completion of the original plans.

The existing ticket office and toilets at Northolt will be enlarged to house a large rectangular booking hall with modern lighting, storage facilities for bicycles, bookstalls and tobacco kiosks. The station frontage will be faced in a light-coloured brick and will incorporate two glazed fronts for the kiosks.

The station buildings at South Ruislip now consist of the domed skeleton structure of

the circular booking hall which will become the dominant feature of the new scheme, directly serving a ticket office, staff quarters, toilets, and bookstall. A shop will serve passing public, and a subway will link Western Region and London Transport platforms.

Elevations will be faced in dark blue-grey brick to contrast with the white translucent glazing cladding the upper part of the booking hall, features of which will be a frieze of pre-cast concrete panels, sculptured in relief, and a concealed lighting scheme. An improved car park and cycle storage with separate access into the booking hall will be provided.

An entirely new station building will be erected at Ruislip Gardens to form a single-storey building containing ticket office, booking hall, staff quarters, toilets, and bookstall, linked by a service road to the public highway. The elevations will be faced in a warm brown brick and vertical panels of polished grey-green Broughton Moor slate. A car park and bicycle storage facilities will be provided and the grounds around the station forecourt will be planted.

At West Ruislip Station, a canopy projecting over the pavement along the entire frontage, a roof over the existing booking hall with clerestory lighting along the front and back, and a staff mess-room will be provided. Shops will be erected over the floor structure adjoining both flanks of the station building.

Staff & Labour Matters

Claims for shorter working week

London Transport busmen are to press for the introduction of a shorter working week. A delegate conference representing 35,000 Central London busmen on March 6 endorsed the recommendation of their negotiating committee that they should seek an 80-hr. fortnight instead of the existing 84-hr. fortnight.

A claim for a 40-hr. week for railway conciliation staff and 38-hr. for railway salaried staff submitted by the three railway trades unions at a meeting of the Railway Staff National Council on February 17 is awaiting a reply from the British Transport Commission.

Questions in Parliament

Victoria Line Project

Mr. Eric Fletcher (Islington East—Lab.) asked the Minister of Transport, on March 1, if he was now in a position to announce a decision to proceed with the proposed new Victoria underground railway to north-east London.

Mr. Marples said he was not.

Mr. Fletcher said the Minister had been saying this for several months, and pressed for a decision.

Mr. Marples replied that it depended upon the re-organisation of the Commission.

Mr. E. Popplewell (Newcastle upon Tyne—Lab.) pointed out that the proposed plan for re-organisation will take two years at least.

Mr. Marples assured him that it did not necessarily mean the hold up of the scheme for two years.

Railway Development in Wales

Mr. Raymond Gower (Barry—Con.) asked the Minister of Transport what capital sums he had authorised for expenditure by the British Transport Commission on railway development and modernisation in Wales during the next three years, to meet the expanding industrial needs of the Principality.

Mr. Marples, in a written answer, said the B.T.C. proposals for railway investment in 1961 which he had approved include schemes in Wales costing about £800,000. No later expenditure had been authorised.

Freight Rates Inquiry

Mr. J. E. Maginnis (Armagh—U.N.) asked the Minister of Transport if he would now announce the date on which the commission being set up to inquire into the freight rates between Great Britain and Northern Ireland is likely to start work.

Mr. Ernest Marples said, in a written answer, that he was still considering membership of the committee.

Pipeline as transportation

Mr. John Arbuthnott (Dover—Con.) asked the Minister of Power on March 6 if he would now make a further statement on H.M. Government policy on pipelines.

Mr. William Warbey (Ashfield—Lab.) asked the Minister if he was now in a position to make a statement on his proposals for future pipeline development and for appropriate legislation.

Mr. Richard Wood, replying, said the Government had decided that it was necessary to legislate to secure in the national interest the orderly development of privately-owned industrial pipelines. Legislation would provide that, where there are objections by public bodies or private individuals to a project, those objections may be heard at a public inquiry and that the Minister's decision would be subject to the approval of Parliament. The various interests that would be affected would be consulted. Mr. Ray Gunter (Southwark—Lab.) asked the Minister whether it was the intention of the Government that the whole matter was to be in the hands of the Minister of Power and if the Minister could give any idea when the legislation would be brought before the House. He also asked if power and authority could be given to a public corporation to develop pipelines.

Mr. Wood said a number of Ministers would share responsibility. No decision has been taken about which Department would be responsible. It would not be possible to legislate in the present Session, but the Government appreciate the need to make progress as quickly as possible. He thought there was a great deal to be said for continuing development by private enterprise under suitable control.

Parliamentary Notes

East Hounslow Station

Mr. R. Harris (Heston & Isleworth—Con.) raised, on the adjournment on February 28, the need for the reconstruction of East Hounslow Station. Mr. A. E. Hunter (Feltham—Lab.) supporting, said it must be the most poorly constructed station on the Piccadilly Line. Mr. Marples said this was a matter for the British Transport Commission and referred Mr. Harris to the Transport Users Consultative Committee for London. He went on that London Transport was aware of the station's shortcomings and intend eventually to rebuild the station.

British Transport Commission Bill, Second Reading

Mr. G. Wilson (Truro—Con.) welcoming the Bill, on March 1, said one of the major disturbances caused by the floods at Exeter was not only inconvenience and damage to the city, but that the Western Region line was interrupted on both sides of Exeter. If the line was cut it was a serious matter not only for Exeter but for everybody westwards. He hoped the works referred to in the Bill would help to improve matters in this respect.

More Underground Lines Needed

The congestion of traffic in London had already reached the stage when they needed far more drastic improvements to the underground than were envisaged in the Bill.

There had been no major construction of underground lines in London for many years. Although there had been extension into the country at either end of some of the lines, the stations in the central area were not capable of carrying much more traffic than they do now because of the length of the platforms.

Mr. Wilson developed economic arguments in regard to the Victoria line against motorways, and cited savings to be made if a larger proportion of passenger traffic travelled underground.

Mr. Dudley Williams (Exeter—Con.) said there had been local criticism of the way with which British Railways had interfered with the flow of the river near St. David's station. He thought it very dangerous.

Minister's Tour of London Stations

Mr. Marples said the Government were not stalling for the sake of stalling on the Victoria Tube line. Everything will be borne in mind when a decision is made.

Mr. Marples agreed that the length of stations in London should be extended and a number are in hand. There is not a peak hour but sometimes a peak 20 minutes in London, and the trains are underused at other times of the day.

If hours could be staggered in London travel would be much easier and more convenient. With the Chairman of the London Travel Committee, Mr. Marples said, he would see a number of people, especially in the Oxford Street area, to find out whether the load can be spread. He had been to Oxford Circus, London Bridge and Liverpool Street and seen the trains draw in to crowded platforms. If things could be spread out for another 20 minutes or half an hour, travelling in London would be much more agreeable.

Mr. Marples said he would contact the Commission regarding the Exeter works.

The Bill was given a second reading.

LUMENATED CEILINGS

An area sales office and showroom has been opened by Lumenated Ceilings Limited at 10, Jesmond Street, Newcastle upon Tyne, 2.

1961 United Kingdom—East Germany Trade Arrangement

Negotiations between the Federation of British Industries and the Chamber of Foreign Trade of the German Democratic Republic on the bilateral trade arrangement for 1961 have resulted in a £4 million, or 28 per cent increase over last year's agreed total volume. The Board of Trade figures for 1960 amounted to about £6·3 million for British imports and £7 million for U.K. exports to East Germany, against the agreed quotas of £7 million for trade in each direction.

Great Britain this year offered 33 new items for export to the German Democratic Republic, of which the East Germans have accepted 23. Among the largest items in the two-way traffic will be British exports of iron, steel and non-ferrous metals amounting to £3·5 million, machine tools worth £220,000, chemical plant worth £200,000, and imports of potash from East Germany worth £2·5 million. Export quotas for many other items have been increased. Among these are:—cotton yarn, from £600,000 to £700,000; whisky, from £3,000 to £10,000; chemicals, from £175,000 to £400,000, and measuring, testing and other scientific instruments, from £115,000 to £200,000.

Great Britain has agreed to increase import quotas for a variety of East German products. Among the largest items are machine tools, £55,000 to £295,000; cinematograph equipment, £90,000 to £230,000; portable typewriters, £60,000 to £100,000, and musical instruments, £10,000 to £130,000.

CONTRACTS & TENDERS

British Railways, Southern Region, has placed the following contracts:—

Aubrey Watson Limited: remedial works to slip at Honor Oak Park

George Wimpey & Co. Ltd.: site investigation at Cannon Street Station

John Mowlem & Co. Ltd.: construction of staff canteen at Ashford electrical carriage repair shop

Demolition & Construction Co. Ltd.: sheet piling to slip at Nunhead

John Mowlem & Co. Ltd.: reconstruction of Beaver Road Bridge, Ashford (Kent) for extension of electrification

Demolition & Construction Co. Ltd.: erection of steel gantries and supply and erection of concrete carriage servicing stages at Ashford (Kent) for extension of electrification

Aubrey Watson Limited: strengthening of harbour wall at Fremington Quay

R. J. Barwick & Sons Ltd.: new staff accommodation at Folkestone Junction, for extension of electrification

R. Corben & Son Ltd.: dismantling of water tank at Faversham

A. E. Farr Limited: repairs to bridge at Barcombe Mills

Mumford, Bailey & Preston Limited: installation of central heating and hot water system at Exmouth Junction motive power depot.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From South Australia:

2 general purpose diesel electric locomotives 3 ft. 6 in. gauge

1 bogie set of wheels, axles, journal bearings, traction motor gears and pinions, as complete assemblies

or alternatively

1 bogie set of wheels, axles, journal bearings, traction motors and gearing as complete assemblies.

The issuing authority is the South Australian Government Railways Commissioner, Adelaide, to whom bids should be sent. The tender No. is C.M.E. 1/61. The closing date is April 13, 1961. The Board of Trade reference is ESB/6820/61.

From Saudi Arabia:

2 spike pulling machines (Fairmont series W–84 or similar)

2 rail lifting machines (Fairmont series W–86 or similar)

2 tie handling machines (Fairmont series W–90 or similar)

2 rail cutting machines

3 rail power drills, similar to Nordberg machines.

The issuing authority is Brown International Inc., 10 Columbus Circle, New York 19, New York, to which bids should be sent. The tender No. is 111 RR/NY. The closing date is March 20, 1961. The Board of Trade reference is ESB/6888/61/I.C.A.

From Pakistan:

28,965 boiler and fuel tubes for steam locomotives.

The issuing authority is the Chief Controller of Purchase, Pakistan Western Railway, Empress Road, Lahore, to whom bids should be sent. The tender No. is 210-S/2/Pt. IV (PIL). The closing date is April 8, 1961. The Board of Trade reference is ESB/6449/61. No further reference is available at the Board of Trade.

76 overhead water tanks of 100 gal. capacity.

The issuing authority is the Chief Controller of Purchase, Pakistan Western Railway, Empress Road, Lahore, to whom bids should be sent. The tender No. is S–60/PIC/3–61. The closing date is April 4, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/6949/61.

510 steel tyres for steam locomotives.

The issuing authority is the Chief Controller of Purchase, Pakistan Western Railway, Empress Road, Lahore, to whom bids should be sent. The tender No. is S-7/PIL/D2-61. The closing date is April 5, 1961. The Board of Trade reference is ESB/6448/61. No further information is available at the Board of Trade.

4,000 seasoned Deodar wooden sleepers 7 ft. x 5 in. x 4 in.

1,200 seasoned Deodar wooden sleepers 10 ft. x 5 in. x 5 in.

1,000 hardwood sleepers 7 ft. x 5 in. x 4 in.

200 hardwood sleepers 10 ft. x 5 in. x 5 in.

The issuing authority is the Deputy Director of Purchase, Water & Power Development Authority, Munshi Chambers, Old Anarkali, Lahore, to whom bids should be sent. Local representation is considered desirable. The tender No. is WP/379/Timber/60. The closing date is March 10, 1961. The Board of Trade reference is ESB/6963/61.

From Egypt :

150 tonnes steel spring washers.

The issuing authority is the Purchases & Stores Department, Railway Building, Shubra Subway, Shubra, Cairo, to which bids should be sent. The closing date is March 25, 1961. The Board of Trade reference is ESB/7366/61. No further information is available at the Board of Trade.

Supply of electrical transformer substation for new signalling workshops at Farz as per specification No. 1002—File No. 144–3/17.

The issuing authority is the Mechanical & Electrical Engineering Department, Egyptian Republic Railways, New Building, Nr. Shubra Bridge, Cairo. The closing date is April 13, 1961. The Board of Trade reference is ESB/7365/61. No further information is available at the Board of Trade.

From Uruguay:

Up to 500 covered wagons of 30 ton capacity

Up to 50 covered wagons of 30 ton capacity for fruit traffic

Up to 50 assembled bogies.

The issuing authority is the Administracion de Ferrocarriles del Estado, Montevideo, to which bids should be sent. The tender No. is 610/61. The closing date is May 11, 1961. The Board of Trade reference is ESB/6466/61.

From India:

Supply and installation of equipment for the following works:

(1) Automatic multi-aspect colour light signalling on the double line section between Chandil and Kandra (8¾ m.).

(2) Automatic multi-aspect colour light signalling on the double line section between Kandra and Sindri (8 m.).

(3) Panel interlocking at Kunki.

The issuing authority is the Chief Signal & Telecommunications Engineer, South Eastern Railway, Garden Reach, Calcutta 43, to whom bids should be sent. The closing date is May 31, 1961. The Board of Trade reference is ESB/6807/61. No further information is available at the Board of Trade.

Supply of equipments, technical supervision, and maintenance of installation for six months of route relay interlocking and train describer units at Sealdah.

The issuing authority is the General Manager, Eastern Railway, Calcutta, to whom bids should be sent. The tender No. is ER/SDA/R.RELAY/IV. The closing date is August 25, 1961. The Board of Trade reference is ESB/7367/61. No further information is available at the Board of Trade.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

NOTES AND NEWS

British Waterways pleasure craft. British Waterways' third and largest display of canal pleasure craft is to be held on the Grand Union Canal, Paddington, from March 17 to 25, and will show the wide variety of craft now available for canal cruising holidays.

Vehicle ferries to and from Britain. Mr. J. L. Harrington, Chief Shipping & International Services Officer, British Transport Commission, read a paper on "Britain's links with European Surface Transport" to the South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, at Cardiff, on March 7.

Testing of Scottish Region electric train. One of the trains withdrawn from the Glasgow electrification scheme made several test runs without incident recently. The tests were held over six miles of the Glasgow-Helensburgh line between Dalmuir and Hyndland.

March meeting of the Institute of Transport. Mr. L. C. Hawkins, London Transport Executive, will be the speaker at the meeting of the Institute of Transport arranged for March 13, 1961, at 5.45 p.m. in the Jarvis Hall, 66, Portland Place, London, W.1, when he will present for discussion a paper on "Mass transportation in the future." The meeting will be open to visitors, without ticket.

Isle of Man Railway Company. Receipts of the Isle of Man Railway Company for the year ended December 31, 1960, were £81,073 compared with £83,320 for the previous year, and expenditure was £71,610 against £74,821. Including the amount carried forward and interest on investments, the total available for 1960 was £16,884 compared with £15,745. After interest on debentures, rent charges and transfer to reserves and renewals, the balance available for dividend was £8,187 compared with £7,948. A dividend of 2½ per cent was recommended on the ordinary capital and the balance of £2,188 was carried forward.

New Works Officer (Manchester) annual dinner. The first annual dinner of the New Works Officer (Manchester), British Railways London Midland Region, was held at the Café Royal, Manchester, on March 3. Among the railway officers who attended were: Mr. M. G. E. Lambert (Line Traffic Manager); Mr. A. I. McMillan (Assistant Engineer, Works Maintenance); Mr. A. Lloyd Owen (New Works Officer, Manchester); Mr. R. V. Hughes (Assistant New Works Officer); Mr. G. E. Woodhead (District Engineer, Manchester); Mr. H. A. Roberts (District Engineer, Liverpool); Mr. C. L. Parkinson (District Engineer, Lancaster), and Mr. G. E. Proctor (Senior Resident Engineer).

Institute of Transport, Midland Section annual dinner. The annual dinner of the Midland Section of the Institute of Transport took place at the Queen's Hotel, Birmingham, on February 24, 1961. The President of the Institute, Mr. K. W. C. Grand, responded to the toast "The Institute of Transport" proposed by the Lord Mayor of Birmingham, Alderman Garnet B. Boughton. The toast "Our Guests" was proposed by the Chairman of the Section, Mr. N. W. Rolfe, who presided, and the response was given by Mr. A. Fogg, Director, Motor Industry Research Association.

B.T.R. Industries dividend increased. The total ordinary dividend of B.T.R. Industries Limited for the year ended October 1, 1960, is 15 per cent, over 2½ per cent more than for the previous year. Sales of most of the company's products rose, including conveyor belting and hose. The results of intensified efforts to increase exports are stated by the Chairman, Sir Walter Worboys, to be encouraging.

Holidays abroad. An increase in the number of motorists taking snap winter holidays abroad is reported by the Southern Region of British Railways. Since winter rates on the cross-Channel car ferry ships were reduced in October, the number of cars crossing has risen by nearly 20 per cent. There are also signs of a record this summer for motoring abroad. The car ferry centre at Victoria Station reports higher bookings than ever before at this time of the year.

Sliding roof demonstration. At a recent demonstration at Paddington, London, W.2, representatives of the British Transport Commission, overseas railways, the Ministry of Transport, and the House of Commons were shown the MacGregor-Comarain sliding wagon roof, described and illustrated in our New Equipment and Processes section of November 6, 1959. Sole manufacturing and exploitation rights for the roof were acquired in 1958 by Rubery, Owen & Co. Ltd., from which company further details can be obtained.

Diesel Engineers & Users Association meeting. A general meeting of the Diesel Engineers & Users Association will be held on March 16, 1961, at 2.30 p.m., at the Memorial Building, the Institute of Marine Engineers, 76 Mark Lane, London, E.C.4. A paper on "Water side pitting of diesel cylinder liners," by Mr. H. H. Collins will be presented.

Holiday return tickets. Eight- and fifteen-day holiday return tickets from stations in the Sheffield area to certain stations in the West of England have proved so popular that British Railways, Eastern Region, has decided to re-introduce the facility during July and August, 1961. These reduced fare holiday tickets give a saving of 25 per cent on each adult ticket, and are available on specified trains running on Saturday evenings from July 22 to August 26.

Annual Report of the Mansion House Association. The seventy-ninth annual report of the Council of the Mansion House Association on Transport, recently published, contains an account of the Association's activities during 1960. Included are reports on the Association's participation in discussions on the Hull Charges Scheme, its opposition to the repeal of Section 2 of the Railway & Canal Traffic Act, 1854, relating to statutory obligations of the Railways to provide "reasonable facilities," and its representation on Demurrage Regulations.

Martonair at Olympia Engineering Exhibition. Pneumatic equipment to be shown by Martonair Limited at the Engineering, Marine, Welding & Nuclear Energy Exhibition at Olympia, London, in April, includes air-line filters and lubricators; silencers; positional controllers for determining the position of pistons in air cylinders; impact cylinders; and valves. A tray lift for raising or lowering trays of components and so on in positions convenient for an operator in

MacGregor-Comerain sliding top on recent demonstration

a workshop will be demonstrated in conjunction with an automatic machine made by Martonair Limited for its own use; this drills and taps cylinder end covers. Details may be obtained from Martonair Limited, Parkshot, Richmond, Surrey.

Examination for London guide lecturers. "Name two of the new diesel Pullman expresses," "Which is the deepest Underground station, and what is the approximate depth?" and "Which London railway system has eight stations, 40 trains, but no drivers or passengers?" were among questions asked in the recent examination for registered guide lecturers on London. Sixteen new guides have been qualified under arrangements made by the British Travel & Holidays Association to cater for the increased numbers expected to visit London this year.

Dowty Group dividend. The board of Dowty Group Limited, has declared an interim dividend of 4 per cent, tax free, on account of the year to March 31, 1961. This compares with the equivalent of 3·1 per cent last year, for which the final dividend was 5½ per cent on the capital increased by a two-for-three scrip issue, making a total equivalent of 9·1 per cent. The total dividend for the current year is expected to be not less than this.

Computer for C.A.V. Limited. C.A.V. Limited, manufacturer of diesel fuel injection equipment, has ordered a LEO III computer for installation in its main works at Acton where it will be delivered at the end of next year. The LEO III design is a fully transistorised digital machine of the second generation, and will be used to produce operational data and management statistics.

Railway Stock Market

Cheerful and active conditions ruled in stock markets with industrial shares again moving higher, helped by a number of factors, in particular the fact that the increase in the value of the West German mark, by making German goods dearer in world markets, should tend to help our export trade. Another helpful factor was the success of the big offer of steel debentures and preference shares to the public.

Dollar stocks tended to attract more attention, but Canadian Pacifics failed to regain all an earlier small decline and, at $41⅛, compared with $42 a week ago. Canadian Pacific 4 per cent preference stock and debentures strengthened to 58⅜ and 60 respectively, sterling securities like these having tended to reflect a firmer trend in British Government stocks. White Pass shares eased from $10⅜ to $10¼.

Mexican Central "A" bearer debentures kept at 60, and United of Havana second income stock at 6¼, but elsewhere, San Paulo Railway 3s. units at 1s. 3¾d. lost part of their recent rise, while Antofagasta ordinary and preference stock at 16 and 36¼ both again moved fractionally lower.

Costa Rica ordinary stock was 41½ with the first debentures 96 and the second debentures 113. Chilean Northern first debentures were 51½, Brazil Railway bonds 4⅜, while Guayaquil & Quito assented bonds have changed hands at 50. Paraguay Central prior debentures were 17½. International of Central America common shares kept at $24½ and the preferred stock at $114½, but quotations were apparently not tested by dealings.

West of India Portuguese capital stock has changed hands up to 117½; the 5 per cent debentures were 96. Barsi Light Railway stock was quoted at 15.

Midland of Western Australia ordinary stock was 6½, and the second debentures, which are quoted in £1 units, have been dealt in at 5s. 4½d. Nyasaland Railways shares held their recent improvement to 10s. 6d.; the 3½ per cent debentures were 35½.

There has been rather more activity among shares of locomotive builders, engineers, and kindred companies, but price movements showed little movement in balance. Beyer Peacock 5s. shares, for instance, remained at 7s., though Charles Roberts 5s. shares strengthened afresh from 9s. to 9s. 3d. Westinghouse Brake eased slightly to 40s. 6d. and G. D. Peters have remained at 20s., while Gloucester Wagon eased slightly to their par value of 10s. and Wagon Repairs 5s. shares were steady at 19s. 6d. North British Locomotive showed a small decline at 6s., and Birmingham Wagon receded further to 21s. 10½d.

Feature in electricals has been a strong upswing in G.E.C. from 31s. 6d. a week ago to 33s. because of the good impression created by the progressive policy being followed by Mr. Arnold Lindley, the new Chairman. English Electric were strong too, having advanced from 33s. 9d. to 37s. 9d. in response to the Chairman's annual review. Moreover, A.E.I. moved from 42s. to 44s. in front of the results. In Cables, B.I.C.C. were up to 57s. 3d. compared with 56s. a week ago, while Johnson & Phillips strengthened from 21s. to 22s. 9d.

Activity continued in Ransome & Marles 5s. shares, which came in for profit-taking after their advance, ending at 21s. 6d. compared with 23s. 9d. a week ago. Pollard Bearing 4s. shares were 37s. 9d., compared with 37s., Stone-Platt eased on balance from 66s. to 65s., but Tube Investments advanced from 74s. 3d. to 78s. 6d. T. W. Ward eased slightly to 73s. 6d., but Vickers rose from 28s. 10½d. to 31s. while Ruston & Hornsby gained 1s. 3d. at 27s. 9d. but Metal Industries at 63s. 6d. reflected a little profit-taking.

Forthcoming Meetings

March 10 (*Fri.*). The Institute of Transport, Yorkshire Section, at the Griffin Hotel, Leeds, at 6.30 p.m. Annual Dinner and visit of President.

March 11-12 (*Sat.-Sun.*). The North Eastern Railway Association, at York. First meeting.

March 13 (*Mon.*). The Institute of Transport, at 66, Portland Place, London, W.1, at 5.45 p.m. "Mass transportation in the future," Mr. L. C. Hawkins.

March 13 (*Mon.*). The Institution of Mechanical Engineers, Industrial Administration & Engineering Production Group, at 1, Birdcage Walk, London, S.W.1, all day. Discussion on Cybernetics.

March 14 (*Tue.*). The British Railways Bristol Lecture & Debating Society, at Bristol, at 5.45 p.m. Annual General Meeting, and "B.T.C. films," Mr. E. Anstey.

March 15 (*Wed.*). The Institution of Electrical Engineers, Supply Section, at Savoy Place, London, W.C.2, at 5.30 p.m. Discussion on "Magneto-hydrodynamic generation of electricity."

March 14 (*Tue.*). The Institute of Transport, North Staffordshire Group, at the Grand Hotel, Hanley, at 6.30 p.m. Annual General Meeting.

March 15 (*Wed.*). The Institute of Transport, Humberside Section, at the Chamber of Commerce & Shipping, Hull, at 6 p.m. "Railway modernisation in Hull and district," Mr. I. G. MacGregor, and "Dock modernisation in Hull," Mr. T. S. Roberts.

March 16 (*Thu.*). The Institute of Transport, East Midlands Section, at Overstone Solarium, Northampton at 1 p.m. "46 years in transport," Mr. N. H. Dean.

March 16 (*Thu.*). The Institution of Electrical Engineers, Utilisation Section, at Savoy Place, London, W.C.2, at 5.30 p.m. "A dynamic model for studying the behaviour of the overhead equipment used in electric railway traction," Mr. D. S. Farr, Mr. H. C. Hall, and Dr. A. L. Williams.

March 16 (*Thu.*). The Institution of Railway Signal Engineers, Bristol Section, at Newport, at 6 p.m. "Train describers," Mr. M. E. Leach.

March 16 (*Thu.*). The Institution of Railway Signal Engineers, at Birmingham Exchanging & Engineering Centre, Stephenson Place, Birmingham, 2, at 6 pm. "Automatic marshalling yards," Mr. J. C. Kubale.

March 16 (*Thu.*). The Diesel Engineers & Users Association, at the Institute of Marine Engineers, 76, Mark Lane, London, E.C.3, at 2.30 p.m. "Waterside pitting of diesel cylinder liners," Mr. H. H. Collins.

March 16 (*Thu.*). The Institute of Traffic Administration, Glasgow Section, at Kenilworth Hotel, Queen Street, Glasgow. Annual General Meeting.

March 16 (*Thu.*). The British Railways, London Midland Region, Lecture & Debating Society, East Lancashire Division, at Manchester, Annual General Meeting and Brains Trust.

March 16 (*Thu.*). The Model Railway Club, at Keen House, Calshot Street, Kings Cross, N.W.1, at 7.45 p.m. "Reminiscences of a railway modeller," Mr. B. L. Young.

March 17 (*Fri.*). The Institute of Transport, Tees-side Section, at the Cleveland Scientific & Technical Institution, Middlesbrough, at 6.30 p.m. "Unorthodox transport systems—do they deserve closer considerations?" Mr. C. F. Klapper.

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March 10, 1961

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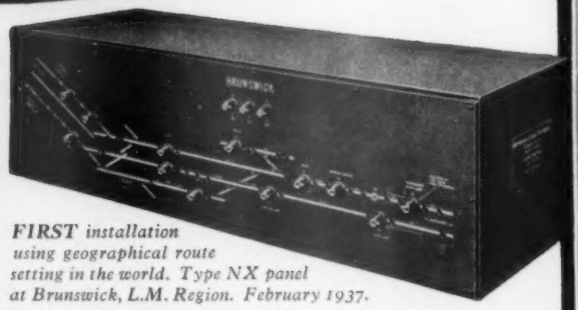
FIRST installation of plug-in relays in Great Britain. Toton Down Sidings. L.M. Region, 1939.



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FIRST automatic marshalling yard with preset speeds in Europe. Panel in control tower at Thornton, Scottish Region. January 1957.

Also:

FIRST relay plugboards with quickly detachable terminals—Heaton Norris, L.M. Region. 1955.

FIRST working demonstration of electronic control for signalling I.R.S.E. Presidential Address. April 1956.

FIRST cab signalling installation in Great Britain. Margam marshalling yard, Western Region.

FIRST automatic warning control inductors and suppressors. Installed between Kings Cross and Grantham, Eastern Region.

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Photographs by courtesy of British Railways.

FIRST fully automatic marshalling yard in Europe. Margam, Western Region. April 1960.

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